

4K94-27

PROJECT OPERATIONAL PLAN
FOR THE 1993 BRISTOL BAY
RED KING CRAB TEST FISHERY PROJECT

by

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and
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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	i
LIST OF FIGURES	ii
LIST OF APPENDICES	iii
FOREWORD	1
INTRODUCTION	1
OBJECTIVES	2
Phase II Tag Retention and Tag-Induced Mortality Study	2
At-Sea Handling Mortality Study	2
METHODS	3
Phase II Tag Retention and Tag-Induced Mortality Study	3
Collection and Transport of Crabs for the Experiment	3
Tagging Procedure	4
Holding Tanks, Feeding, and Daily Maintenance Procedures	5
Monitoring of PIT Tagged and Non-PIT Tagged Crabs	5
Data Collection from Dead Crabs	6
At-Sea Handling Mortality Study	6
Sample Design	6
Tagging Procedure	6
Release Procedure	6
DATA ANALYSIS	7
Phase II Tag Retention and Tag-Induced Mortality Study	7
At-Sea Handling Mortality Study	7
SCHEDULES	8
REPORTS	8
LITERATURE CITED	9
APPENDICES	16

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Phase II ADF&G/SMC red king crab injury and disease codes	10

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Phase II tank assignments for 95 Kodiak area male red king crabs transported to the Seward Marine Center on August 4, 1993	11
2. Phase II ADF&G/SMC red king crab PIT tag injection and identification record	12
3. Phase II ADF&G/SMC red king crab daily tank observation record	13
4. Phase II ADF&G/SMC red king crab daily observation record	14
5. Power of Fisher's exact test in hypothesis test for Phase II tag retention and tag-induced mortality study	15

LIST OF APPENDICES

<u>Appendix</u>	<u>Page</u>
A. FY94 Yellowbook for the Bering Sea crab test fishery project	16
B. Shipboard Instructions for the 1993 Bristol Bay Tagging and Cost Recovery Charter	18
C. 1993 Bristol Bay tag recovery program memoranda and tag recovery news releases	94
D. List of reports and presentations generated from the Bristol Bay red king crab PIT tag project	103

ALASKA DEPARTMENT FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES

PROJECT OPERATIONAL PLAN

Title: Bristol Bay Red King Crab Test Fishery Project

Yellowbook Project No.: TF-960 (Appendix A)

Project Leader: Leslie J. Watson PCN:1857
Biometrician: Douglas Pengilly PCN:1227

Date Submitted: June 1994

Region: Westward
Fishery Unit: Bering Sea/Aleutian Islands Crab
Fishery: Bristol Bay Red King Crab
Fishery Management Plan: Fishery Management Plan for the Commercial King and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands

File Name: C:\POP\POP93LJW.793

APPROVALS

Level	Signature	Date
Project Leader:	_____	_____
Regional Biometrician:	_____	_____
Research Supervisor:	_____	_____
Regional Supervisor:	_____	_____
Headquarter's Receipt:	_____	_____
Headquarter's Approval:	_____	_____
Headquarter's Recommendation:		
Further Review:	_____	_____
Approval:	_____	_____

FOREWORD

This project, funded under the State of Alaska Bering Sea crab test fishery program, is in its fourth year and is a continuation of Bristol Bay red king crab tagging studies initiated in 1989. Operational plans for 1990, 1991, and 1992 are documented in Watson and Pengilly (1993b, 1992, and 1993a, respectively).

The FY94 project has five components: 1) a 21-d charter to conduct tagging for assessment of handling-induced mortality and to collect crabs for project cost recovery, 2) Phase II of the 18-month holding tank study in progress at the Seward Marine Center since October 1992, 3) recovery of externally-tagged red king crabs from the 1993 Bristol Bay red king crab fishery, 4) development of an imaging processor for Tanner, snow and hybrid crab identification initiated in December 1992 (W. Donaldson, Alaska Department of Fish and Game, Kodiak, personal communication), and 5) Tanner and snow crab genetic stock identification studies (initiated July 1992)(S. Merkouris, Alaska Department of Fish and Game, Anchorage, personal communication). The total budget for the Bering Sea crab test fishery program is \$345,000: \$295,000 for Bristol Bay red king crab tagging studies and \$50,000 for the genetics component (Appendix A).

For purposes of this operational plan, only Phase II of the holding study and a pilot at-sea handling-induced mortality tagging effort will be described. Phase I methods are described in Watson and Pengilly (1993a). Details on the cost recovery charter are contained in Appendix B; information regarding the 1993 tag recovery effort is in Appendix C. A list of reports and presentations generated from the project since its inception is given in Appendix D.

INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) has investigated the possible applications of passive integrated transponder (PIT) tags to mark-recapture studies of mature male red king crabs *Paralithodes camtschaticus* in the Bristol Bay fishery (Pengilly and Watson 1992a, Watson et al. 1991). The objectives of the PIT tag program have been reviewed by Watson and Pengilly (1993a), with the primary objective of estimating the rates at which legal red king crabs are harvested by the commercial fishery. Secondary objectives are to estimate the annual survivorship rate of mature male crabs, the recruitment rate of pre-recruit crabs into the subsequent year's fishery, and the rate at which legal crabs carry over into the following year's fishery.

The first phase of PIT tag retention and tag induced mortality investigations was conducted from November 1992 to July 1993 at the Seward Marine Center (SMC) in Seward, AK. Objectives, methods and study design are described in Watson and Pengilly (1993a). Results from this study were somewhat inconclusive due to sustained, relatively high mortality of tagged and untagged crabs. Phase II of the study re-examines the objective stated for Phase I: first, to determine whether survivorship of male crabs injected with PIT tags in the right fifth leg is reduced relative to the survivorship of untagged crabs under controlled laboratory conditions, and second, to assess

PIT tag retention rates for all tagged crabs for the duration of the experiment (Watson and Pengilly 1993a).

A pilot at-sea tagging study will be implemented during the 1993 Bristol Bay red king crab test fishery charter for the purpose of assessing the effects of crab release methods on crab mortality. Our study is one of several being conducted this year to address the lethal and sublethal effects of at-sea handling on non-target crabs caught during Bering Sea crab fisheries. Implications for appropriate release methods of crabs during future large-scale tagging efforts will also be discussed.

OBJECTIVES

Phase II Tag Retention and Tag-Induced Mortality Study

The primary objectives of the Phase II study are to perform the following hypothesis test at a significance level of $\alpha = 0.1$ and with a probability of $\beta \leq 0.2$ of detecting a 20% reduction of survivorship in PIT tag injected crabs relative to uninjected crabs:

$$H_0: S_t = S_u \text{ vs } H_a: S_t < S_u, \text{ where}$$

S_t denotes the probability that a PIT tag injected new-shell crab with a carapace length of > 110 mm survives and retains a functioning PIT tag for 90 days after tagging, and

S_u denotes the probability that a comparable uninjected crab survives for 90 days under identical conditions.

Secondary objectives are:

1. Collection of data on the location of PIT tags injected into the right fifth walking leg to examine for evidence of over-injection or migration of PIT tags out of that segment and into other leg segments or towards the abdomen and loss of tags during molt.
2. Collection of data for exploratory analyses that would be contingent upon the results of the primary study objectives. Such analyses include: analyses of mortality in PIT tag injected and uninjected crabs as a function of time; analyses of PIT tag loss as a function of time; and, analyses of effects of PIT tag injection on timing of molt onset and growth-per-molt.

At-Sea Handling Mortality Study

The objectives of the at-sea handling mortality study are to:

- 1) Test the hypothesis

$$H_0: R_t = R_c \text{ vs } H_a: R_t < R_c, \text{ where}$$

R_t is the probability of a commercial fishery recovery of a Floy tag from a tagged legal crab released using the methods for "Treatment Pots", and

R_c is the probability of a commercial fishery recovery of a Floy tag from a tagged legal crab released using the methods for "Control Pots"; and,

2) Estimate $C_{t,1993}/C_{c,1993}$ and $C_{t,1994}/C_{c,1994}$, where

$C_{t,i}$ is the catch rate during the year i commercial fishery for crabs tagged and released using the methods for "Treatment Pots", and

$C_{c,i}$ is the catch rate during the year i commercial fishery for crabs tagged and released using the methods for "Control Pots".

Release methods for "treatment" and "control" pots are described below in the Methods section. Briefly, the first objective is to determine if the two different preseason tag release methods are associated with different recovery rates during the 1993 Bristol Bay red king crab commercial fishery and in subsequent fisheries. Results of this study will be used to determine release protocol in future tagging studies and in evaluating recovery rates from past tag release studies. The second objective is to estimate the reduction in commercial fishery capture rate due to the "treatment pot" release method relative to the "control pot" release method.

Additionally, differences in recovery rate due to release methods could be an indication of differences in mortality rates between the two treatment groups; thus the results also have bearing on evaluation of handling mortality of discarded crabs during the commercial fishery. Under the assumption that catch rates during fisheries are the same for all surviving crabs that were released from the same tagging station (see Methods), the second objective can be modified to estimates of the survival rate to the beginning of the year i fishery of "Treatment" crabs relative to that of "Control" crabs.

Statistical comparisons of recovery rates will be performed within individual commercial fisheries. Our primary interest is in the comparison of recovery rates between treatment groups during the 1993 season. Power of the tests will be contingent upon the recovery rates during the fisheries. A comparison of recovery rates from the 1994 season is also of interest but low recoveries in 1994 may result in low power of the test.

METHODS

Phase II Tag Retention and Tag-Induced Mortality

Collection and Transport of Crabs for the Experiment

As mentioned in the introduction, the overall condition of the Phase I crabs at the time of collection and transport from Dutch Harbor, AK was likely compromised by several factors. First, many of the crabs selected at sea were survivors from on-deck handling survival studies.

These same animals were also subjected to 1-2 weeks of rough weather conditions in the holding tank of the survey vessel prior to landing at Dutch Harbor. Although the packaging operation in Dutch Harbor was efficient, these crabs were out of the saltwater environment for almost 12 hours between Dutch Harbor and Seward. Also of note is that Phase I red king crabs were taken from a relatively cold water Bering Sea environment (3-5°C) and placed in a relatively warm water Gulf of Alaska environment (8.5-9°C) at the SMC. Following macroscopic inspection by SMC personnel, Phase I crabs were determined to have a high incidence of chitinoclastic bacterial infections, apparently higher than any other group of red king crabs kept at the facility. In summary, Phase I crabs probably did not meet the stated requirement of 'healthy, non-injured crabs' necessary for the study.

In order to provide crabs in the best possible condition prior to transport and to minimize the added stress of transport, test animals from the Kodiak area were selected for Phase II studies. Approximately 150 new-shell male red king crabs with carapace widths between 6 in and 6.5 in were to be collected from the Chiniak Bay area near Kodiak, AK in late July 1993. Due to difficulties in obtaining crabs in the 6 in to 6.5 in carapace width range, the range was expanded to include animals with carapace widths between 5.5 in and 7 in.

The chartered vessel FV Michelle Ann, set a series of 12, 6 1/2 ft by 6 1/2 ft commercial Tanner crab pots in several locations in the general vicinity of Middle Bay. Pots were initially set on 7/29/93 and retrieved several times before retrieving them for the last time on 8/4/93. Crabs were stored in pots in Middle Bay up until delivery day; at that time the crabs were placed in the live tank of the vessel and brought to the boat harbor in Kodiak for packaging. Overall, about 95 crabs were collected, about 60 crabs less than the desired total of 150 crabs. All non-injured crabs were carefully packed in 80 lb 'wet-lock' waxed fish boxes with wet burlap and several packages of frozen blue ice to keep the crabs moist and cool during transport. Crabs were packed 6 - 9 animals per box, with the animals in an upright position with burlap between crabs to reduce abrasion from spines and to keep crabs from moving in the box.

The crabs were flown directly from the Kodiak airport to Seward following packaging. Immediately upon arrival at the SMC, six crabs were placed in each of 15 tanks, with 5 crabs placed in the 16th tank (Figure 1). Each crab was submerged in the tank by hand to facilitate release of air bubbles trapped in the gills. After the air bubbles were released, the crabs were allowed to drift to the bottom of the tanks. Several crabs spewed a small amount of brown-green liquid (bile?); however, all crabs were moving their mouth parts and were in an upright orientation following placement in the study tanks. The maximum amount of time the crabs were out of saltwater was 3 hours.

Tagging Procedure

Tags and tagging equipment used in the experiment are identical to those used in Phase I. After a 20-30 d stabilization period following collection and transport, each crab will be externally marked with a cable tie tag and PIT-tagged as described in Watson and Pengilly (1993b). Carapace length will be measured along with other observations concerning the condition of each tagged crab (Table 1). All data will be recorded as shown in Figure 2.

Three of the six crabs in each tank will be randomly selected for PIT tagging. Regardless of whether or not a crab will be PIT-tagged, each crab will be pulled and sampled identically to ensure that all crabs receive the same amount of handling. PIT tag equipment and injection procedures are as described in Watson and Pengilly (1993b).

Holding Tanks, Feeding, and Daily Maintenance Procedures

Several problem areas were identified with the tank holding protocol established in Phase I studies. First, all test crabs were in a single 12 ft diameter tank, which may have contributed to the sustained mortality rate documented throughout the study. Possible overcrowding may have exacerbated already high levels of shell rust (chitinoclastic bacterial infections), and facilitated cannibalism. As noted above, the interior tank water temperatures likely exceeded the comfort zone for Bering Sea red king crabs, especially in late fall, 1992, with the end result being increased metabolic stress.

In order to ameliorate perceived effects of overcrowding, a maximum of six crabs will be placed in each of 16 exterior tanks. This density is based on the recommendation of SMC personnel that these study tanks probably should have no more than 10 adult male crabs each and optimally, only 5 or 6 crabs (A.J. Paul, SMC, Seward, AK, personal communication). The sixteen outside saltwater holding tanks are of two sizes: 1000-liter and 750-liter capacity. Each tank has independent water inflow and outflow pipes. The tanks are housed in an open-air shed with a roof and a single side wall; the tanks do not have individual covers.

Crabs will be fed every other day and each tank will be cleaned on the days when crabs are not fed. In addition to the standard chopped herring diet, SMC personnel were asked to provide other food types to discourage cannibalism, as recommended by Dr. T. Shirley (University of Alaska, Juneau, AK, personal communication). Suggested food items included shrimp, octopus and seaweed.

The incoming water temperature from the 80 m intake pipe will be recorded daily along with the water temperature of each tank and the air temperature at the outdoor tank compound. Dissolved oxygen readings will be taken daily at each tank to alert caretakers to any anomalies in water exchange rate. Data from these observations will be recorded as in Figure 3.

Monitoring of PIT Tagged and Non-PIT Tagged Crabs

All live crabs will remain in the tanks for a full 90-d period. If a crab molts within the 90-d period, it will remain in the tank and the other crabs will be removed to another outside tank while the molted crab recovers. The length of the post-molt shell hardening period necessary to thwart cannibalism is unknown; however, the commonly accepted 10-14 day period is likely not long enough for captive molting crabs to evade cannibalism as many of the molted crabs in Phase I died from cannibalism. As crabs at the SMC are only monitored several times per day and never at night, when most molting activity appears to begin, study crabs will likely suffer some degree of cannibalism. Due to holding capacity constraints and the large sample size ($n=95$ crabs), it is not feasible to isolate each crab as a preventative measure against cannibalism.

Commencing 30 days after initial tagging and every 30 days thereafter, each crab will be pulled one at a time and its cable tie tag number recorded. If the cable tie tag number corresponds to a PIT-tagged crab the PIT tag injection wound will be examined. Each PIT-tagged crab will be checked for a properly functioning PIT tag. All procedures for monitoring of PIT tagged crabs is identical to those described for the Phase I study (Watson and Pengilly 1993b). Data from these observations will be noted as shown in Figure 4.

Data Collection from Dead Crabs

Data will be collected from dead crabs as described in Phase I studies (Watson and Pengilly 1993b). Collection of PIT-tagged abdomens will be a priority, especially for crabs that have molted. Following the close of Phase II, collected PIT-tagged abdomens will be subjected to x-ray analysis to note the position of the PIT tag within the tagging segment.

At-Sea Handling Mortality Study

The study will be conducted aboard the test fishery charter vessel, FV Cascade, from September 1-20, 1993 and will be generally located where legal male Bristol Bay red king crabs are concentrated in commercial quantities. Tagging will commence on the first day pots are pulled and will continue each day unless it is impossible to tag due to weather. A tagging goal of at least 2,400 legal male red king crabs, to be released from a minimum of 60 stations is expected.

Sample Design

Each tagging station will consist of two pots spaced 1/8 (0.125) nm apart; geographic orientation of the two pots can be arbitrary as long as the distance between pots is 0.125 nm. The first pot picked from each station will be the **control pot**; the second pot will be the **treatment pot**.

Tagging Procedure

Tagging procedures will be identical for crabs captured at control pots and treatment pots. Crabs will be tagged as described in Watson and Pengilly (1992b). All healthy, non-injured legal male red king crabs up to a maximum of 30 crabs per pot will be measured (carapace length), assessed for legal status, shell-aged, tagged, and released immediately after tagging.

Release Procedure

Tagged crab release procedure will differ between control pots and treatment pots as follows:

Control Pots: Crabs from control pots are to be released by placing, not dropping, each crab in the water trough, with the abdomen or ventral side down. Each release from a control pot shall be done while the vessel is at a complete stop on the location where the pot was lifted or, if necessary, just making enough headway to stay out of the trough during rough seas.

Treatment Pots: Crabs from treatment pots are to be released by dropping the crab overboard from the same place on deck and from the same height (deck rail height) with the carapace facing

down, i.e., drop the crab flat on its back. Each release from a treatment pot shall be made while the vessel is moving forward in a straight line at approximately 7.5 knots.

Sample design, shipboard procedures, and data forms for this experiment are fully detailed in Appendix B.

DATA ANALYSIS

Phase II Tag Retention and Tag-Induced Mortality Study

We assume that there will be no heterogeneity in survival rates within treatments (PIT-tagged and not PIT-tagged) among the individual holding tanks and plan to pool data from all tanks. The data will be examined for any indications of heterogeneity among tanks and will be screened for any mortalities due to trauma not related to tagging (e.g., cannibalism of molting crabs) prior to analysis. The hypothesis test will be performed using Fisher's exact test (Agresti 1990). Power of the $\alpha=0.1$ test for varying levels of S_u and S_t/S_u is shown in Figure 1. Desired power of the test ($\beta=0.25$ when $S_t/S_u=0.8$) with the planned 45 tagged and 45 untagged crabs will require high ($S_u \geq 0.9$). The hypothesis test will also be performed using data from both the Phase I and Phase II tag retention and tag-induced mortality studies according to a two-strata 2X2 contingency table design (Cox and Snell 1989) incorporating data from both Phase I and Phase II will increase the power of the test.

At-Sea Handling Mortality Study

The hypothesis test for Objective 1 will be performed using the methods for testing significance of treatment effects for data in k 2X2 contingency tables (Cox and Snell, 1989), where the k contingency tables represent the tag release-tag recovery data for the two different treatment types from the k separate tagging stations. This test assumes that treatment effects are homogenous across tables (tagging stations). Presence of heterogeneity of treatment effects in separate tables (tagging stations) will be tested using the likelihood ratio test for the full (different treatment effects in different tables) against the reduced model (homogeneity of treatment effects) (Cox and Snell, 1989).

Estimates of catch and survival rates of the crabs released from "treatment" plots relative to those released from "control" pots will be performed using the "multiple lot" methods of Burnham et al. (1987), where different tag release stations represent different "lots".

Secondary objectives for the 1993 tagging study are to examine the recovery data for trends related to density of crabs at tagging stations, spatial distribution of tag release sites, and shell age of released crabs.

SCHEDULES

7/93-6/94	Project planning; data analysis and reporting (Watson and Pengilly)
8/93	Collection and transport of Phase II red king crabs (Watson et al.)
9/93	Phase II lab study implemented; crabs PIT-tagged (Watson and Pengilly)
9/93-3/94	Phase II study monitoring (Watson and Pengilly)
9/93-10/93	1993 Bristol Bay red king crab cost recovery and tagging charter; at-sea handling study (Watson et al.)
11/93	1993 Bristol Bay red king crab fishery; tagged crab recovery effort (Watson et al.)
11/93	X-ray analysis of Phase I PIT-tagged tail sections (Watson and Pengilly)
3/94	Phase II experiments ends (Watson and Tracy)
3/94-6/94	Phase II data entry and analysis (Watson and Pengilly)
5/94	X-ray analysis of Phase II PIT-tagged tail sections (Watson)

REPORTS

1. A summary of biological data collected during the 1993 Bristol bay red king crab cost recovery and tagging charter. Reg. Inf. Rep. Byersdorfer, Watson, and Tracy. June 1994. (final report)
2. PIT tag retention and tag-induced mortality studies of Bristol Bay red king crabs, November 1992 - March 1994. Fish. Res. Bull. Watson and Pengilly. December 1994. (final report)
3. An assessment of at-sea handling release mortality of legal male red king crabs. Reg. Inf. Rep. Watson and Pengilly. December 1994.

LITERATURE CITED

- Agresti, A. 1990. Categorical data analysis. John Wiley & Sons, New York.
- Burnham, K.P., D.R. Anderson, G.C. White, C. Brownie, and K.H. Pollock. 1987. Design and analysis methods for fish survival experiments based on release-recapture. Monograph 5, American Fisheries Society. Bethesda, Maryland.
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- Watson, L.J., and D. Pengilly. 1992. Project operational plan for the 1991 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Informational Report 4K92-31, Kodiak.
- Watson, L.J., and D. Pengilly. 1993a. Project operational plan for the 1992 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Informational Report 4K93-5, Kodiak.
- Watson, L.J., and D. Pengilly. 1993b. Project operational plan for the 1990 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Informational Report 4K93-17, Kodiak.

Table 1. Phase II ADF&G/SMC red king crab injury, disease, and mortality codes

Code	Description
1	Torn or crushed leg segment, including claws or dactyls; any new injuries to leg segments
2	Cracked carapace or abdomen, including broken spines, holes in carapace or abdomen; any new injuries to carapace or abdomen
3	Chitinoclastic bacteria (shell rust), to any degree
4	Broken rostrum or broken rostrum tip
5	Barnacles, mussels, or other epifauna on the shell
6	Shell abrasion ('tank wear') on ventral surface, especially on coxa of walking legs
7	Missing legs (with black 'caps') or regenerated legs; old injuries not related to capture, transport, tagging, or holding
8	Gross body or shell deformity; any old injury to carapace or abdomen
Add more codes and descriptions as necessary	

Figure 1. Phase II tank assignments for 95 Kodiak area male red king crabs transported to the Seward Marine Center on August 4, 1993.

Large Tanks (1000-L)		Small Tanks (750-L)	
Tank Number	No. of Crabs	Tank Number	No. of Crabs
2	6	7	6
3	6	8	6
4	6	9	6
5	6	10	5
6	6	16	6
19	6	17	6
20	6	18	6
21	6		
22	6		

12

PHASE II ADF&G/SMC RED KING CRAB PIT TAG INJECTION AND IDENTIFICATION RECORD PAGE ____ OF ____

RECORDED(S) _____

[illegible]

0 - Soft
1 - New
2 - Old
3 - Very Old

INJURY/DISEASE/MORTALITY
See attached code sheet
Record in multiple columns a-e

0 - Yes
1 - No
2 - NA

0 - Yes
1 - No
2 - NA

		SIZE GROUP TALLY RECORD			
		PIT - TAGGED		NOT TAGGED	
		TALLY	TOTAL	TALLY	TOTAL
1					
2					
3					

____/____/____
mm dd yr

Recorder(s)

[illegible]

⁵number of molted crabs in tank

14

PAGE _____ OF _____

RECORDER(S) _____

[illegible]

Fate
0 - Alive
1 - Dead
2 - Molting

PIT Tag Detected

0 - Yes
1 - No
2 - NA
3 - Loose tag in tank

Tell Collected

0 - Yes

1 - No

2 - NA

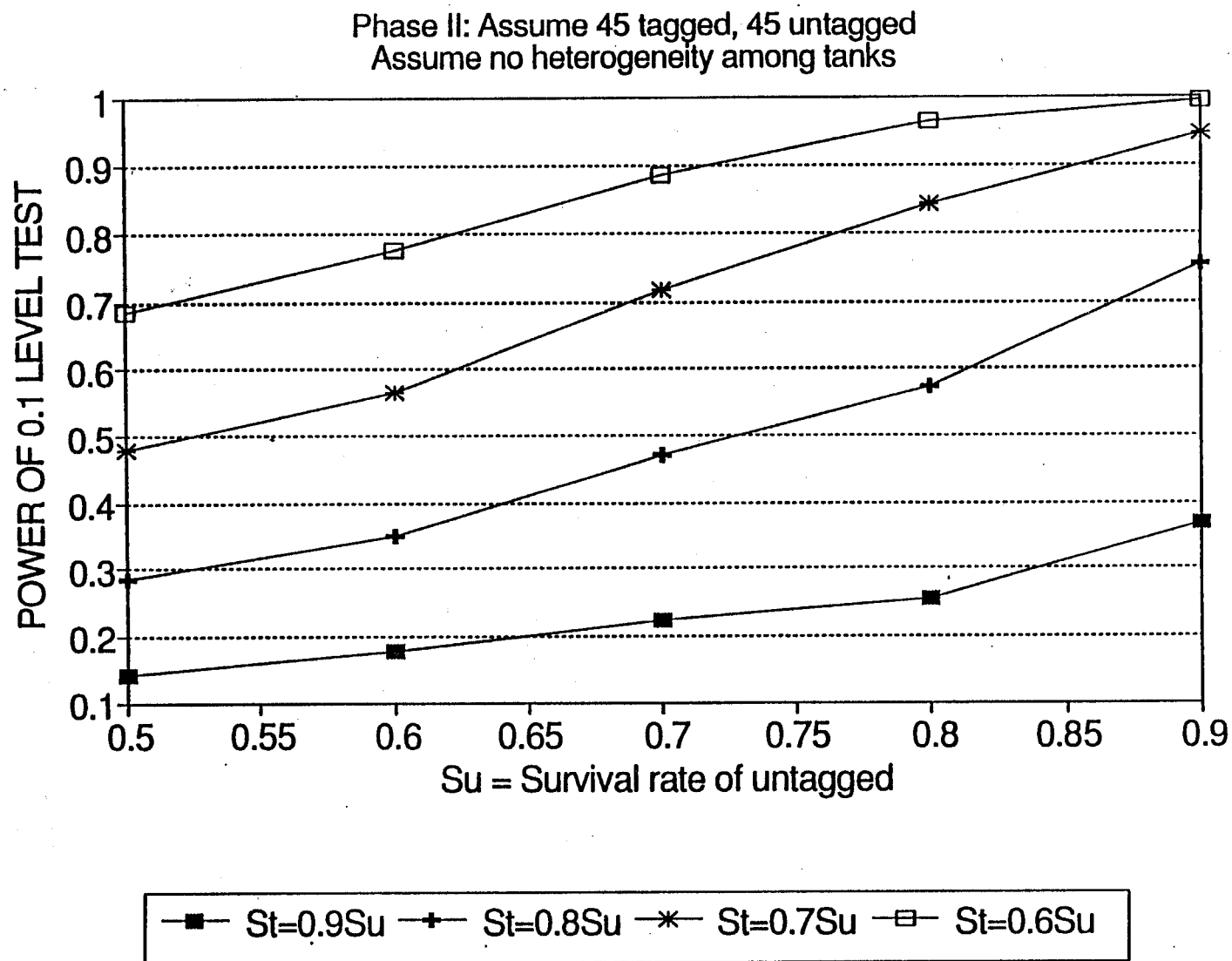


Figure 5. Power of Fisher's exact test in hypothesis test for Phase II tag retention and tag-induced mortality study

APPENDIX

Appendix A. FY94 Yellowbook for the Bering Sea crab test fishery project. Note that the Yellowbook allocation reflects the legislative approved project amount of 459.9K. Program receipts of 345K reflect the FY94 actual project cost.

PROJECT TITLE: Bering Sea Crab Test Fishing	PROJECT NUMBER: TF-960
FISHERY UNIT: Bering Sea/Aleutians Crab	LEDGER: 74119751
COMPONENT: COMMERCIAL FISH BPS# 3800	PRINTORD: No order
LOCATION: Kodiak	REGION: 4
SUBCOMPONENT: Test Fish Funds	PRIORITY: 1.00
LEGISLATIVE DISTRICTS : 27	

PROGRAM ELEMENT: Test Fish Survey
FISHERIES AFFECTED: Bering Sea Crab

USER GROUPS AFFECTED: Commercial

SPECIES AFFECTED: King Crab and Tanner Crab

PROJECT DESCRIPTION

Funding from this project will support the State's direct expenses for conducting shellfish tagging projects and genetics investigations in the Bering Sea. The Bristol Bay red king crab harvest was valued recently in excess of \$100 million. Error in estimating natural mortality rates and population abundances can jointly provide major errors in development of Guideline harvest levels. Additional Bering Sea Tanner species and stock I.D. development research can be conducted.

PROJECT OBJECTIVES

Bering Sea crab populations are assessed to provide information for development of guideline harvest levels. Data will be collected on all crab captured during the surveys. Long term tag recovery data should provide information on natural mortality rates to be used in estimating harvest rates designed to meet conservation and economic objectives established by the BOF.

BUDGET MANAGER: 1857 - Leslie J. Watson - Marine Fisheries Biologist

BUDGET DETAIL: CODE/LINE ITEM	PY91	PY92	PY93	PAGE2 SUMMARY	
	*****	*****	*****	*****	93.4 PFT
100 PERSONAL SERV	0.0	98.5	160.7	165.4	72.0 Other
200 TRAVEL	0.0	25.4	22.1	22.1	
300 CONTRACTUAL	28.9	393.7	223.2	223.2	
400 COMMODITIES	0.0	24.6	53.5	49.2	
500 EQUIPMENT	0.0	125.5	0.0	0.0	
700 GRANTS	***	***		0.0	
	*****	*****	*****	*****	
PROJECT TOTALS:	28.9	667.7	459.5	459.9	
	*****	*****	*****	*****	
FEDERAL RECEIPTS	0.0	0.0	0.0	0.0	
GENERAL FUND	0.0	0.0	0.0	0.0	
INTERAGENCY RECPTS	0.0	0.0	0.0	0.0	
PROGRAM RECEIPTS	28.9	667.7	459.5	459.9	
GENERAL FUND MATCH	0.0	0.0	0.0	0.0	
STAFF MONTHS	0.	13.2	26.	29.	

PROJECT TITLE: Bering Sea Crab Test Fishing

UNIT: Bering Sea/Aleutians Crab

COMPONENT: COMMERCIAL FISH

BPS# 3800

PROJECT NUMBER: TF-960

LEDGER CODE: 74119751

PRINT ORDER: No order

REGION: 4

PERSONAL SERVICES DATA

PCN	TITLE & NAME	R S LOC	Range			days		hours			TOTAL COST
			93	94	MM	SEADUTY	Premium Pay	OT	HAZ	SHIFT	
1117	FB I - Byersdorfer, Su A S CAA	14D	14E	6.0	21	0	0.	0.	0	\$30,794	
1351	FB II - Tracy, Donn A S BKB	16B	16B	5.0	21	0	0.	0.	0	\$31,007	
1390	FB II - Merkouris, Sus A F EBA	16F	16J	3.0	0	0	0.	0.	0	\$15,539	
1843	FT III - Rudge, Kimber P S CAA	11F	11F	0.5	0	0	20.	0.	0	\$2,721	
1857	FB III - Watson, Lesli P F CAA	18F	18F	12.0	11	4	0.	0.	0	\$77,872	
1888	FT II - Mittelstadt, K A S EBA	09A	09A	2.5	0	0	0.	0.	0	\$7,473	
Personnel Totals =					29.0		\$6,110		\$513	\$165,410	

PROJECT LINE ITEM DETAIL

LINE#	DESCRIPTION	Thousand \$\$\$ AMOUNT	COMMENT
72240	Field Travel	14.8	Travel
72500	Per Diem	7.3	Per Diem expences.
73100	Professional Services	100.0	Image Processing
73100	Professional Services	2.5	Photo processing.
73100	Professional Services	3.0	F.I.T.C.
73300	Communication	2.0	Telephone
73400	Trasportation	0.6	Excess baggage
73500	Advertising, Printing & Bind	0.6	Printing
73860	Rental Machinery & Equipment	2.0	Truck Rental
73860	Rental Machinery & Equipment	110.0	Test Fish Charters. ✓
73900	Other Expenditures & Services	2.5	Freight
74220	Office & Library Supplies	2.0	Tag rewards
74220	Office & Library Supplies	2.0	Office Supplies
74480	Household & Institutional	1.5	Gloves, hardware, (etc).
74480	Household & Institutional	1.0	Groceries
74520	Professional & Scientific	16.9	Lab Equipment
74600	Other Operating Supplies	1.0	Dry Ice
74600	Other Operating Supplies	24.8	Was equipment
75870	Laboratory & Scientific Equip	0.0	Pit Tag Supplies
75870	Laboratory & Scientific Equip	0.0	Misc. Computer
75870	Laboratory & Scientific Equip	0.0	Pit Readers
75870	Laboratory & Scientific Equip	0.0	Genetics Lab & Chem Supplies
TOTAL LINES 200 - 700		294.5	
TOTAL PROJECT COST		459.9	

Appendix B. Shipboard Instructions for the 1993 Bristol Bay Tagging and
Cost Recovery Charter

Shipboard Instructions
for the
1993 Bristol Bay Test Fishery Charter

by

Leslie J. Watson

September 20, 1993

TABLE OF CONTENTS

LIST OF APPENDICES	i
SAFETY BRIEFING	1
GENERAL BRIEFING	1
OBJECTIVES	3
METHODS	4
Cost Recovery	4
Handling Mortality (Tagging) Study.....	6
Random Catch Sampling	9
Floy-Tagged Crab Recovery	9
Observer Practicum Crab Collection	10
Crab and Snail Collection for Paralytic Shellfish Poison (PSP) Testing	10
Collection of Red King Crabs for Genetic Stock Identification	11
Video and Photo Documentation	11
MISCELLANEOUS INSTRUCTIONS AND REMINDERS	12
APPENDICES	13

LIST OF APPENDICES

Appendix B.1.	1990, 1991, and 1992 survey report catch data	14
Appendix B.2.	Forms and Examples of Properly Completed Forms	34
Appendix B.3.	Table of Random Digits	44
Appendix B.4.	List of Equipment	49
Appendix B.5.	Calendar	50
Appendix B.6.	Contract between the State of Alaska and the FV Cascade	52
Appendix B.7.	Sampling Instructions for Genetic Stock Identification (S. Merkouris)	68

SAFETY BRIEFING

***** Check your suit, EPIRB, and strobe prior to departure *****

The captain and crew have been instructed to run through the shipboard safety drill with you PRIOR TO DEPARTURE (as per the contract), including pulling the general alarm, and where you should be in case of an emergency. Do not go on the back deck or anywhere outside when seas are rough, especially alone (no photo or video is worth it). If you assist in working the gear, pay attention to buoy lines and trailers, slick decks and pots (ADF&G personnel will NOT bait pots). Obey the captain in regards to your safety and the safety of others. Be careful.

GENERAL BRIEFING

Donn Tracey is this year's cruise leader. Assisting personnel are Susie Byersdorfer and Kathy Hobart. Any problems that arise should be channeled through Donn should the situation present itself. Clean up any work areas that you use, including the galley table. Keep the data safe, as dry as possible and organized. Make sure the deck paperwork tracks with the pilot house records; check this on a pot by pot basis. Although it is the cruise leader's responsibility to ensure data soundness, he may delegate this task to the biological crew. Please assist the cruise leader any way you can. If you have questions about the data, the deck protocol, or anything related to the work you are conducting please ask before you act. The cruise leader will note DAILY any changes in sampling plans, the cumulative number of crabs put aboard the vessel for cost recovery, and the number of crabs tagged each day.

THE DATA SHOULD BE READY FOR DATA ENTRY WHEN THE VESSEL ARRIVES IN DUTCH HARBOR. All data should be checked every day; do not wait until the next day as you will 'lose' whatever short-term details of the day's events overnight. On this issue, there is no compromise, so don't ask! Remember, all survey data is confidential to ADF&G and the captain of the FV Cascade; we cannot release any data prior to the completion of the 1993 Bristol Bay red king crab fishery (you will get requests, demands, etc. for this data, especially at tank inspection time).

Maintain your sampling equipment and ensure that it is cleaned up and stored safely inside the vessel at the end of each sampling day (calipers, clipboards, tags, tagging needles, etc.).

Where possible, offer your assistance to the vessel crew. Please clean up after yourselves if you have coffee or snacks between meals. Offers to wash dishes, make coffee, cook, and general cleaning are often appreciated greatly by the vessel crew, especially when you are not working and the vessel crew is.

Try to maintain a daily radio schedule either with Dutch Harbor or Kodiak (time to be decided before the vessel leaves Dutch Harbor). If you cannot contact ADF&G, the captain can check in daily with Westward or ???.

Timesheets. Please record all hours worked in the stop-start columns (this does not include running time to and from the grounds, unless you are working). Report time you left port and time you returned to port. You are not overtime eligible while at sea. For those in "A" retirement, you are eligible for hazard pay only for the hours you worked. For pay periods that will be completed while you are at sea, timesheets will be filled out and submitted for you. Please sign timesheets for pay periods ending September 30 and October 15 and leave with Marilyn.

Have fun and take care; it's a big ocean out there.

OBJECTIVES

Listed below are the major objectives of the test fishery charter. Cost recovery is the priority of the charter. Each item is explained along with necessary forms and documentation under the appropriate section under Methods. Carefully review all of this; get your questions answered before the vessel leaves the dock.

1. **Cost Recovery.** Catch approximately 8,100 male red king crabs \geq 6 inches carapace width (CW) for delivery to Westward Seafoods on October 21, 1993.
2. **Handling Mortality (Tagging) Study.** This is a pilot experiment using at-sea tagging to determine the short-term (30 days or less) mortality of legal male red king crabs following capture and release.
3. **Random Catch Sampling.** Sample catches for species composition and size distribution from ten (10) randomly selected pots per day. Carapace lengths (or widths), legal status, shell age and other associated data will be taken for all crabs caught in sampled pots.
4. **Floy-Tagged Crab Recovery.** Drop everything and document all captures of tagged crabs, regardless of agency or date of tagging. Release crabs after documentation is completed.
5. **Observer Practicum Crab Collection.** Collect crabs for the observer practicum to be conducted onboard the F/V Cascade at Westward Seafoods, 0900 October 21, 1993.
6. **Crab and Snail (get key?) Collection for PSP Testing.** Collect, label and freeze red king crab, *C. bairdi*, *C. opilio*, *bairdi* X *opilio* hybrids, and snails as per DEC instructions.
7. **Collection of Red King Crabs for Genetic Stock Identification.** Collect 100 crabs for S. Merkouris.

METHODS

Cost Recovery

Catch approximately 8,250 male red king crabs \geq 6 inches CW (approximately 52,000 lbs using 6.3 lbs average weight). For reference, last year's survey average C/P of legal and pre-recruit crabs (\geq 6 inches) was 18.0. For this year's needs, this translates to around 450 pot lifts. Hopefully, fishing will be better this year.

We need a minimum of \$335,000 (approx. 8,100 crabs at 6.3 lbs average weight) to cover the cost of the project (total includes the price of the charter); but shoot for higher amount (8,250 crabs). If the crabs are all legal size, you may need to catch fewer crab. Conversely, if the crabs tend to be small (6 inches) then you may need more. We have not delivered bairdi for sale for the past two years in much quantity; you can decide whether or not to retain bairdi for sale based on the condition of the crabs. Bid price per pound is \$6.57 for red king crab and \$1.86 for C. bairdi crab.

To get started fishing, you may want to review the station summaries for the previous 3 survey years with the captain (Appendix B.1.)

Ensure that the Pilot House Log (Form 1, Appendix B.2) is completely filled out at the end of each day, including the catch per pot (C/P) for male red king crabs \geq 6 inches CW that are put in the tanks. It is the cruise leader's responsibility to make sure the captain completes this task. If the biological crew is asleep during cost recovery fishing, make sure the deck boss hails the C/P to the captain for recording. If bairdi are also put aboard, have the captain put this information next to the red king crab C/P data. For pots where tagging is done, remember to complete the C/P column and the remainder of the form. Please instruct the captain to place a check mark next to the sequential pot numbers of the pots where tagging is to occur.

Using the code sheet provided (get one from M. Ward or R. Morrison), please report via radio the daily catch and cumulative total of the cost recovery catch aboard, in numbers of crabs on the Cost Recovery Daily and Cumulative Catch Record (Form 2).

Keep a daily log of activities, dates, any miscellaneous observations, Floy tag recoveries, problems, a running tally of how many crabs you have aboard, how many crabs were tagged, sampling irregularities, etc. Review all data forms for accuracy and completeness at the end of each day.

Fish ticket for Test Fishery Delivery. Tracey will handle the paperwork for the delivery of crabs to Westward Seafoods; this transaction in no way involves the Cascade or the captain of the Cascade. A crewmember from the FV Cascade can take weights for the vessel; provide him with a notebook for this purpose; return this information to me, along with the check and the completed fish ticket and copies. To complete the fish ticket, bring the CFEC card(s) to the Westward business office and fill in the information as follows. Estimates of deadloss must be entered on the ticket with the appropriate code by species. Compute the average weight of the crabs and record the catch by appropriate statarea(s). Record Vessel Name as: ADF&G-Kodiak 1993 Bering Sea Test Fishery. Remember, we are tax-exempt. Triple-check the fish ticket before you sign it, making sure it is complete and accurate. Do not sign the fish ticket until you have received a check for payment-in-full (as per the bid conditions). The check is to be made out to: State of Alaska, 211 Mission Road, Kodiak, Alaska 99615. Verify the amount of the check. Any problems or questions on the transaction can be resolved by calling Watson immediately.

Payment to the FV Cascade for the charter. Please ask the captain to send a bill for the amount as agreed to in the charter contract to Linda Wright, 211 Mission Road, Kodiak, AK 99615.

Handling Mortality (Tagging) Study

This is a pilot experiment using at-sea tagging to determine the short-term (30 days or less) mortality of legal male red king crabs following capture and release. The issue of handling-induced mortality was a major topic of discussion at last February's Alaska Board of Fisheries meeting.

Because the charter is 21 days, it is not cost-efficient to split the charter and make two cost recovery deliveries (too much running time). It will be necessary to conduct tagging and cost recovery fishing at the same time (i.e., on the same days). It is expected that it may take a week to locate good concentrations of legal crabs for cost recovery fishing. These areas will also be prime sites for tagging. Once you are on the grounds and have a feel for catch rates of cost recovery crabs, you may be able to set aside entire days for tagging, preferably on the front-end of the charter. Tagging will commence on the first day pots are pulled and will continue each day unless it is impossible to tag (due to weather). We would like to tag 2,400 legal male red king crabs, to be released from a minimum of 60 stations. Expect to work 12 hour days to accomplish this ambitious but entirely feasible goal.

Sample Design. A minimum of three tagging stations will be attempted each day; stations should be added or subtracted depending on cost recovery efforts. Each tagging station will consist of two pots spaced $1/8$ (0.125) nm apart; geographic orientation of the two pots can be arbitrary as long as the distance between pots is 0.125 nm. The first pot picked from each station will be the **control pot** (record as sample type 1 on Form 3); the second pot will be the **treatment pot** (record as sample type 2 on Form 3). Determination of locations of the stations is left to the discretion of the vessel captain and the ADF&G crew leader so that they can adapt to the needs of cost recovery fishing and to the running time that is necessary for the release of tagged crabs from the **treatment pots** (see below). If it is possible to devote entire days to tagging (without cost-recovery fishing) concentrate your efforts where the crabs have been found at highest densities and aim for at least eight stations a day.

Tagging Procedure (common to control and treatment pots). Tagging procedures will be identical for crabs captured at control pots and treatment pots, except for the method of release.

When a tagging pot comes aboard, start the stopwatch; when the last of the tagged crabs in the pot is returned to the sea, stop the stopwatch and record the elapsed time. Inform the vessel captain when the last tagged crab from the pot is released, so that "LOCATION OF LAST RELEASE FROM TAGGING POT" can be recorded in the Pilot House Log. During tagging, it will not be necessary to sample the contents beyond what is required to obtain legal crabs for tagging. All healthy, non-injured legal male red king crabs up

to a maximum of 30 crabs per pot will be measured (carapace length), 'stuck' for legal status, shell-aged, tagged, and released immediately after tagging. Although you will tag a maximum of 30 crabs per tagging pot, you must count the total number of legal crabs in the pot to determine the sampling factor. This is simply the number of crabs tagged/number of legal crabs in the pot (e.g., 30/51 means you tagged 30 of 51 legal size crabs in the pot). Record all required data on the **Tagging Record-Handling Mortality Study** (Form 3). For sequential tagging station number, begin with station number 1 (remember, each pair of pots is a single tagging station). Tagging station number is not on the Pilot House Log so make sure that you know what sequential pot numbers the tagging pots are (these will match with the Pilot House log).

All crabs should be handled gently during sorting, measuring and tagging. Do not tag any crabs with cracked carapaces, torn leg segments, or any other major, new injuries. Crabs with old injuries (regenerated legs, black caps, etc.) may be tagged. The tags we are using this year will be "A" series, numbered 1-5,000. An additional 1,600 tags w/o series letters numbered 11300-11399 and 13500-14999 are also available to use should we exhaust the supply of the 5,000 "A" series tags first. Please check each crab for chitinoclastic bacteria (shell rust) and note this on the data form under 'Others'. This disease is characterized by black pits in the shell or a black edge around old injuries. It appears to be very common in Bering Sea red king crabs, so common that no one is noting its presence.

Release Procedure. Tagged crab release procedure will differ between control pots and treatment pots as follows:

Control Pots: Crabs from control pots are to be released by placing (not dropping) each crab in the water trough, with the abdomen (ventral side) down while the vessel is at a complete stop on the location where the pot was lifted (or, if necessary, just making enough headway to stay out of the trough during rough seas).

Treatment Pots: Crabs from treatment pots are to be released by dropping the crab overboard from the same place on deck and from the same height (deck rail height) with the carapace facing down (i.e., drop the crab flat on its back) while the vessel is moving at approximately 7.5 knots. (Check speed with captain; if this too fast determine a reasonable speed and stick with it). The direction that the vessel is traveling in while crabs are being released is unimportant and is left to the discretion of the captain and ADF&G crew leader. What is important is that vessel is traveling as close to the target speed as possible and in a straight line (not in a circle, arc, or zig-zag). Since a maximum of 30 crabs from each pot are to be tagged and released, release from treatment pots should not require more than 1/2 hour of running time; take this into account when determining the locations

of tagging stations relative to each other and to cost-recovery fishing pots.

Random Catch Sampling

Sample all crab species from ten (10) pre-selected pots per day; record all required data (CL or CW, legal or juvenile/adult, shell age, egg clutch conditions, etc. on the Crab Research Data Form (Form 4). Use a separate form for each species and sex; this is necessary because you may have different sampling factors (see next paragraph). You must randomly pre-select your pots each day prior to actually seeing the pots come aboard. Once you have pre-selected the 10 pots for the day, you cannot change your mind (whether or not the pot is empty or chock-full!). This is to be done using the Table of Random Digits (Appendix B.3.). Here's an example of how to use the random digit table:

The captain says he will pull 75 pots today. You need to sample 5 of those. In order to select the five pots, you decide to start with the 7th number in the first column, count by multiples of 10 and pick the first 5 numbers between 1 and 75 (looking at the first 2 digits).

You must use a different random selection scheme every day. We'll go over this before you leave. If the weather is too rough, or you have worked to exhaustion and can't sample the randomly-selected pots, note these anomalies in your daily log.

Measure all male red king crabs ≥ 120 mm CL. If subsampling is desirable, measure 20 each male red king crab < 120 mm CL, females ≥ 90 mm CL, and females < 90 mm CL. *C. bairdi* and *C. opilio* crabs can be subsampled by measuring carapace widths (CW) of 5 of each sex. This is the same subsampling scheme we used last year. For all subsampled crabs, make sure to determine the sampling factor (e.g., 20/87 means you measured 20 of 87 animals caught in that pot). If you measure all the crab of a species/sex group, just write 'all' through the sampling factor data columns. If 10 pots per day is too much (or too little) work, you can reduce-or increase-the number of pots sampled per day.

Floy-Tagged Crab Recovery

Be on the look-out for tagged crabs, especially during coast recovery fishing. These tags are harder to see than most of us realize, so remind the crew to keep a look-out, as well.

When a Floy-tagged crab is captured, even if it is one you tagged yesterday, SAMPLE IT IMMEDIATELY. Tagged crabs are the priority sampling task whenever they are found. Document recovery of all tagged crabs on the Bristol Bay Red King Crab Tag Recovery Form (Form 5), including tag letter (if appropriate), tag number, measurement, legal status, shell age, capture date and location. Also note the buoy number so that you can retrieve the capture location data from the captain. Return the crab to the sea as soon

as possible. However, if the tagged crab is one of ours and the number is 1-3,421 (less than 3,422), scan for the PIT tag and record the number. If the scanner is working but you cannot detect the PIT tag, sacrifice the animal, and collect, label and freeze the tail section. Collection labels for recording capture date and location information are in the forms supply box. Byersdorfer will Speedmark the tails to Watson at the end of the survey for analysis. Instruct the crew to wake you up if they catch a tagged crab while you are asleep so that you can sample it. THIS INFORMATION IS VERY IMPORTANT; PLEASE STRESS THE IMPORTANCE TO THE CREW.

Observer Practicum Crab Collection

Collect crabs for the observer practicum. This will include 50 or so female red king crabs (we'll have plenty of males), 200 *C. bairdi* (male and female), any Korean hair crabs, brown and blue king crabs, *C. opilio*, and any other odd-ball crabs. Use Form 6 to keep track of what you have aboard. If possible, these crabs could be kept in a separate tank (or perhaps the tank with a lesser amount of cost recovery crabs in it). This will improve access for observer candidates and also reduce the possibility of people walking on the cost recovery crabs during the off-load.

Crab and Snail Collection for Paralytic Shellfish Poison (PSP) Testing

We have received a request from DEC again this year for the collection of crabs and snails during our charter for PSP and demoic acid testing. You will need to collect, label and freeze 12 red king crabs, 12 *C. bairdi*, 12 *C. opilio*, 12 *bairdi* X *opilio* hybrids and any snails you catch (up to a maximum of 50 total). Try to collect a couple crabs from each statistical area the vessel pulls gear in. The captain can tell you when you're in a new area (refer to the Bristol Bay statistical area chart). Collection labels for recording capture date and location information are in the forms supply box. As no sampling plan came with this request, just take 2 small males of each species (put red king crabs in one bag w/label, *C. bairdi* crabs in another w/label, etc.) from a single pot in each statistical area at your convenience. For documentation's sake, record all data required using the **Crab Research Data Form** (Form 4). At survey's end, please xerox these data sheets for my records and put originals in one of the boxes for DEC. The Dutch Harbor DEC office is aware that these samples will be coming in October 20 and will send someone down to pick them up when the vessel comes in. I have asked DEC to provide some feedback to us when the samples are analyzed.

Collection of Red King Crabs for Genetic Stock Identification

Plan on collecting 100 red king crabs as outlined in Appendix B.7. for S. Merkouris, ADF&G-Anchorage. Each collected animal must be marked or held separately so that animals can be identified as to their capture date and location. As we are not fishing systematically, it may be easiest to collect these animals as part of the 10 pot random sample. Using the Crab Research Form, you can note in the comments that the crab is for genetics sampling. This will tie the deck data to the Pilot House Log; location data will be transcribed to the **Red King Crab Electrophoretic Sampling Form** (Form 8). You may also wish to consider marking these crabs using electrical cable ties and Tanner disc tags. Byersdorfer has been instructed on how to apply this temporary tag. Please do not record this tag number in the data entry columns, put it in the comments section instead. If possible, we will try to deliver these crabs for cost recovery. In order for this to work, these crabs must be weighed prior to Genetics sampling and returned to the processing line ASAP following sampling. Byersdorfer will be available to assist Merkouris in this effort.

Video and Photo Documentation

Wherever possible, vigorously document your activities aboard the vessel, especially the tagging effort. Both video and photo documentation of the *control vs treatment* release procedures would be valuable. If the quality is good, we may put together a short video or slide presentation for the next Board of Fisheries meeting. Try to get some overall footage of sampling and fishing activities (no, we don't need anymore photos of gulls flying off the stern!). Video footage will be documented on Form 7.

MISCELLANEOUS INSTRUCTIONS/REMINDERS

1. Leave CFEC cards with Rance.
2. Check your survival suit prior to departure.
3. Check your supply of forms, sampling equipment, and rain gear prior to departure (Appendix D).
4. Charter itinerary and schedules are reviewed in Appendix E.
5. Leave all receipts for purchases with Marilyn.
6. If there are no forms to record other data you collect, make them up. The Pilot House Log must be completed at the end of each day. Complete every column in every form as required. The data you collect is literally worth a fortune (the cumulative value of this project is now over a million dollars). I know you'll all do a great job.
7. Be careful.
8. Have fun.

APPENDICES

Appendix B.1 1990, 1991, 1992 ADF&G pot survey report catch data

Appendix B.1. 1990, 1991, 1992 ADF&G pot survey report catch data.

**A PILOT MARK-RECAPTURE STUDY USING EXTERNAL TAGS
AND IMPLANTABLE PASSIVE INTEGRATED
TRANSPONDER (PIT) TAGS ON RED KING CRAB IN
BRISTOL BAY, ALASKA**



Regional Information Report No. 4K91-21

**Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, Alaska 99615**

October 1991

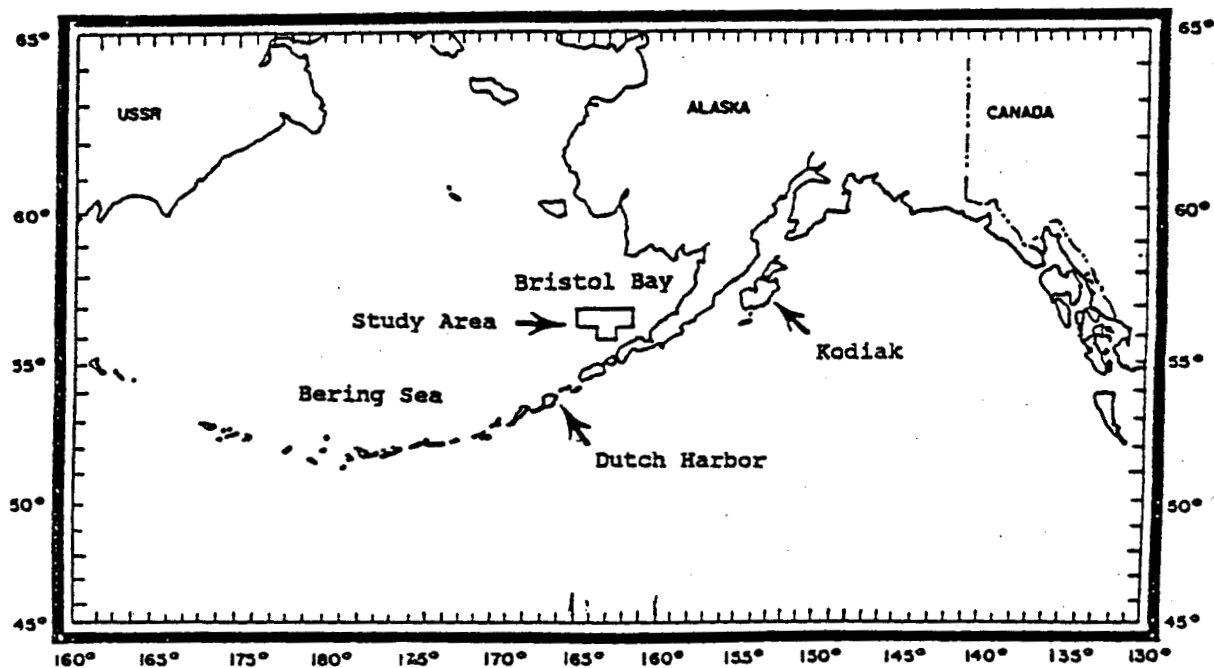


Figure 1. Location of the 1990 Bristol Bay red king crab tagging study.

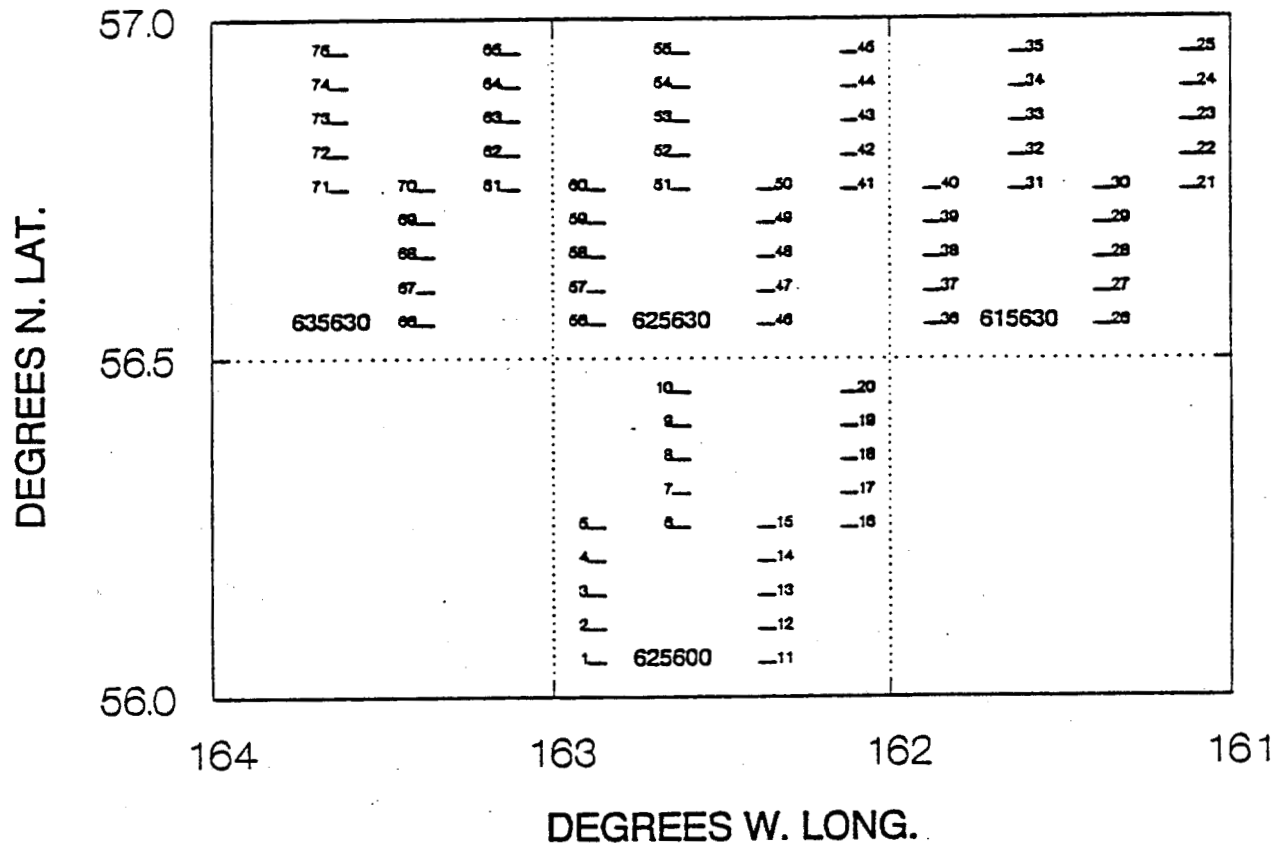


Figure 2.

Layout of the 75 tagging stations in the 1990 Bristol Bay red king crab tagging study. Note that stations 21-25 were not sampled.

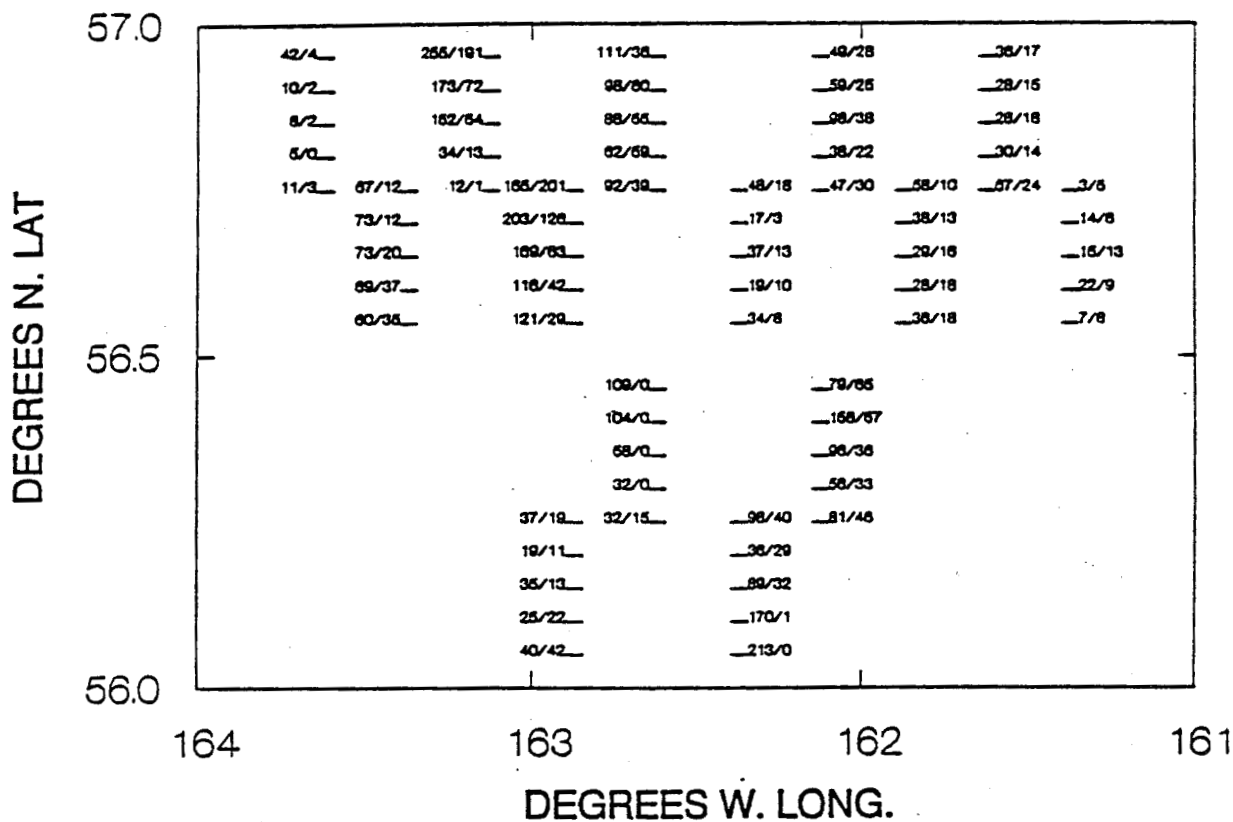


Figure 4.

Distribution of PIT tagging effort (number of legal males/number of sub-legal males), by station and statistical area for the 1990 Bristol Bay red king crab tagging study.

Summary data from the 1990 Bristol Bay tagging survey where red king crabs were taken.

Station	Date	Lat	Long	Loran C	Depth (FMS)	No. Pots Sampled	Females	Males			Average Catch/Pot Of Legals (>134 MM)
								<110 MM	110-134 MM	>134 MM	
1	8/9	56 3	162 52	472273 339992	44	14	264	28	178	95	24.0
2	8/9	56 6	162 51	472218 339846	44	14	77	6	92	52	3.7
3	8/10	56 9	162 52	472264 339739	45	14	90	31	145	65	4.6
4	8/10	56 12	162 52	472275 339613	44	14	76	3	41	34	2.4
5	8/10	56 15	162 52	472263 339477	45	14	4	3	60	78	5.6
6	8/10	56 15	162 37	471272 339678	42	14	335	8	77	63	4.5
7	8/10	56 18	162 37	471284 338952	43	13	86	8	30	40	3.1
8	8/10	56 21	162 37	471287 338818	43	14	123	6	42	67	4.8
9	8/11	56 24	162 37	471290 338682	42	14	179	6	52	108	7.7
10	8/11	56 27	162 37	471256 338530	41	15	240	36	123	117	7.8
11	8/11	56 3	162 22	470291 339203	41	14	1216	14	208	239	17.1
12	8/12	56 6	162 22	470293 339075	40	14	2921	30	208	194	13.9
13	8/12	56 9	162 23	470318 338960	41	7	551	12	58	91	13.0
14	8/12	56 12	162 22	470301 338825	38	7	491	22	166	169	24.1
15	8/12	56 15	162 22	470301 338693	41	7	143	11	59	106	15.1
16	8/13	56 15	162 8	469323 338310	42	8	613	10	75	89	11.1
17	8/13	56 18	162 7	469283 338162	44	7	415	5	53	57	8.1
18	8/13	56 21	162 7	469273 338021	40	7	248	7	54	102	14.6
19	8/13	56 24	162 6	469266 337886	47	7	154	5	78	164	23.4
20	8/13	56 27	162 7	469273 337749	38	8	530	234	113	86	10.8
26	8/15	56 33	161 22	466266 336324	39	7	43	2	7	10	1.4
27	8/15	56 36	161 22	466241 336169	36	7	205	5	16	21	3.0
28	8/15	56 39	161 22	466242 336028	36	7	78	5	16	15	2.1
29	8/15	56 42	161 22	466211 335873	42	8	59	2	8	13	1.6
30	8/15	56 45	161 22	466207 335722	40	7	112	71	7	4	0.6
31	8/17	56 45	161 37	467219 336100	38	8	369	123	65	66	8.3
32	8/17	56 48	161 37	467184 335938	43	7	10	9	23	29	4.1
33	8/16	56 51	161 37	467194 335792	41	7	20	3	25	29	4.1
34	8/16	56 54	161 37	467189 335636	38	7	50	4	25	29	4.1
35	8/16	56 57	161 38	467200 335484	37	7	22	7	22	36	5.1
36	8/14	56 33	161 52	466262 337078	43	7	122	6	25	40	5.7
37	8/14	56 36	161 52	468246 336928	37	7	765	19	38	30	4.3
38	8/14	56 39	161 52	468253 336787	43	7	97	8	28	28	4.0
39	8/14	56 42	161 52	468237 336631	43	7	109	123	16	40	5.7
40	8/14	56 45	161 52	468196 336469	43	6	31	4	15	57	9.5
41	8/18	56 45	162 7	469236 336871	37	7	46	8	35	51	7.3
42	8/18	56 48	162 7	469193 336702	39	7	70	29	32	42	6.0
43	8/18	56 51	162 7	469204 336555	39	7	31	40	75	100	14.3
44	8/18	56 54	162 7	469202 336397	37	7	62	193	99	60	8.6
45	8/18	56 57	162 8	469220 336248	33	8	410	22	55	51	6.4
46	8/19	56 33	162 22	470237 337843	40	7	31	5	19	36	5.1
47	8/19	56 36	162 22	470236 337708	40	8	16	2	18	20	2.5
48	8/19	56 39	162 22	470233 337553	37	7	14	7	28	35	5.0
49	8/19	56 42	162 22	470258 337419	38	8	7	15	14	16	2.0

-Continued-

Sta- tion	Date	Lat	Long	Loran C	Depth (FMS)	No. Pots Sampled	Females	Males			Total	Average Catch/Pot Of Legals (>134 MM)
								<110 MM	110- 134 MM	>134 MM		
50	8/19	56 45	162 22	470204 337247	38	7	59	116	39	51	206	7.3
51	8/20	56 45	162 37	471231 337652	37	7	57	63	93	93	249	13.3
52	8/20	56 48	162 37	471222 337496	36	7	220	27	117	61	205	8.7
53	8/20	56 51	162 37	471198 337334	35	7	301	33	135	93	261	13.3
54	8/20	56 54	162 37	471194 337177	36	7	420	1	85	105	191	15.0
55	8/20	56 57	162 37	471181 337013	35	7	345	2	41	118	161	16.9
56	8/21	56 33	162 52	472273 338658	42	7	3	3	52	119	174	17.0
57	8/22	56 36	162 52	472242 338501	41	7	2	4	55	124	183	17.7
58	8/21	56 39	162 52	472255 338360	40	7	1	7	85	172	264	24.6
59	8/21	56 42	162 52	472262 338214	39	7	0	6	162	225	393	32.1
60	8/21	56 45	162 52	472243 338057	37	7	1	16	314	187	517	26.7
61	8/22	56 45	163 7	473247 338465	38	7	1	0	1	13	14	1.9
62	8/22	56 48	163 7	473254 338316	37	7	0	0	17	36	53	5.1
63	8/23	56 51	163 7	473222 338151	36	7	0	1	75	155	231	22.1
64	8/23	56 54	163 7	473237 337998	36	7	0	8	111	172	291	24.6
65	8/23	56 57	163 7	473206 337830	35	7	0	29	275	285	589	40.7
66	8/24	56 33	162 22	474273 339475	44	7	1	5	39	70	114	10.0
67	8/24	56 36	162 22	474284 339333	42	7	0	1	19	71	91	10.1
68	8/24	56 39	162 22	474269 339181	41	6	1	0	23	75	98	12.5
69	8/24	56 42	162 22	474277 339037	40	7	1	0	11	79	90	11.3
70	8/24	56 45	162 22	474245 338875	39	7	2	2	11	71	84	10.1
71	8/24	56 45	162 38	475276 339300	40	7	0	0	2	12	14	1.7
72	8/24	56 48	162 37	475258 339138	39	7	0	0	0	5	5	0.7
73	8/25	56 51	162 37	475253 338983	38	7	0	0	2	9	11	1.3
74	8/25	56 54	163 37	475255 338826	38	7	0	0	2	11	13	1.6
75	8/25	56 57	163 37	475218 338657	37	7	0	0	5	43	48	6.1
TOTALS						579	12950	1521	4394	5329	11244	9.2

TECHNICAL FISHERY REPORT 92-14



Alaska Department of Fish and Game
Division of Commercial Fisheries
P.O. Box 25526
Juneau, Alaska 99802-5526

October 1992

**A Summary of Biological Data Collected During the
1991 Bristol Bay Red King Crab Tagging Study**

by
Susan Byersdorfer
and
Leslie J. Watson

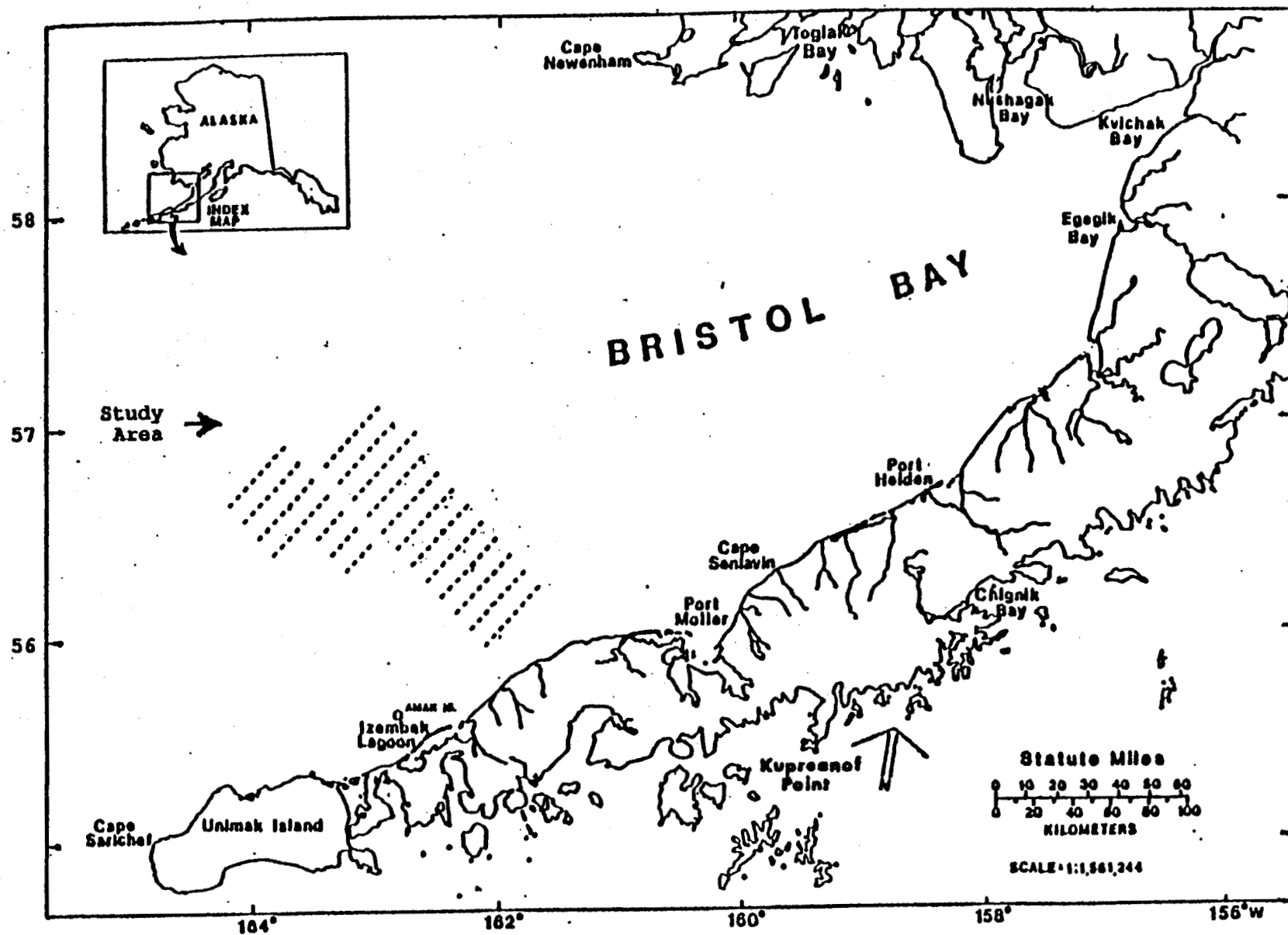


Figure 1. Location of 1991 Bristol Bay red king crab tagging study.

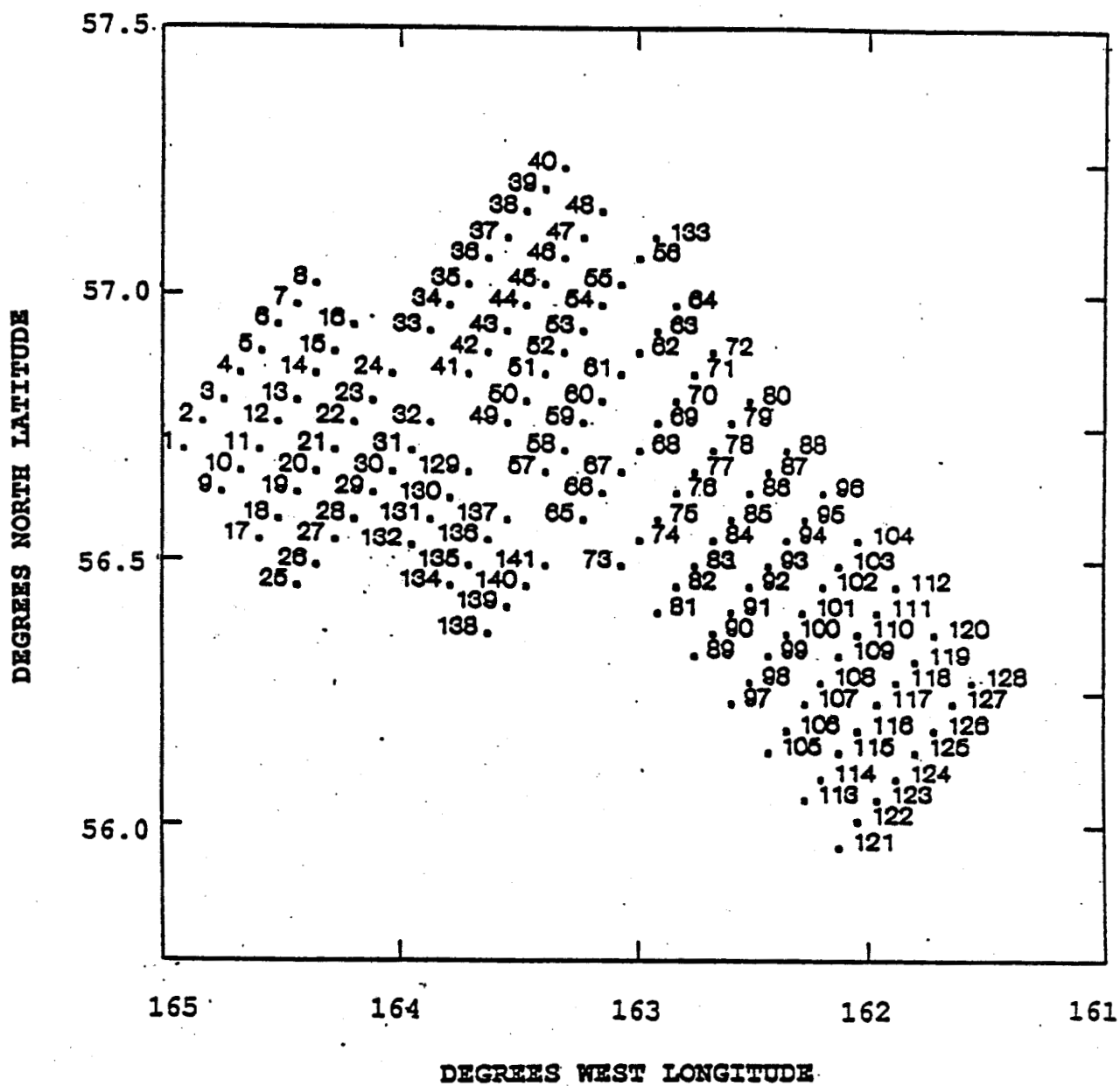


Figure 2. Layout of the 141 tagging stations in the 1991 Bristol Bay red king crab tagging study.

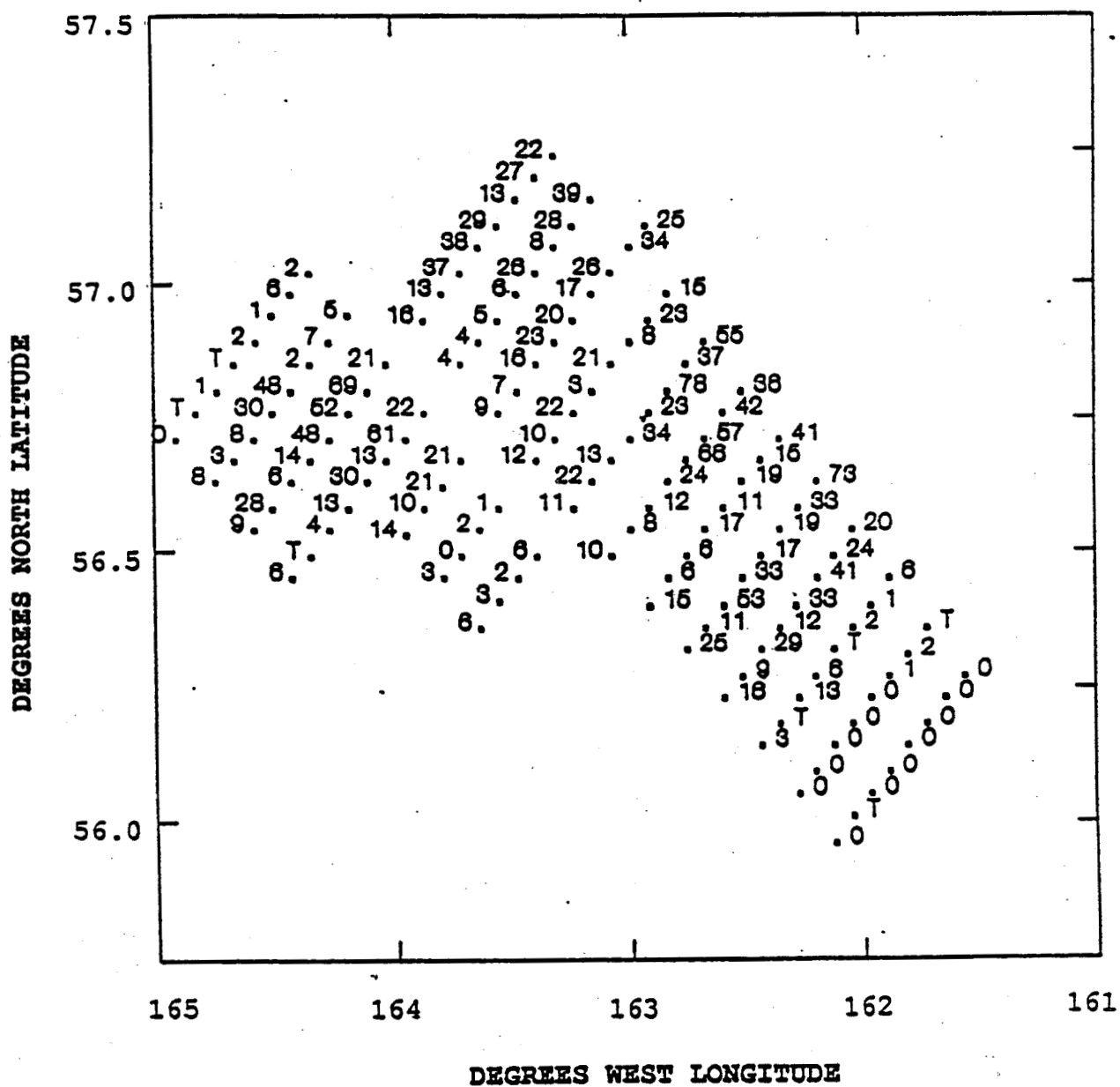


Figure 3. Average catch per pot of legal male red king crabs at 141 stations sampled during the 1991 Bristol Bay red king crab tagging study. Values are rounded down to the nearest whole integer, except for trace (T), which is between 0 and 1.

Summary of red king crab fishing and catch data at 141 stations in the 1991 Bristol Bay tagging study.

Sta- tion	Date	North Lati- tude	West Longi- tude	Depth (m)	No. of Pots Sampled	Females	Males			
							Sublegal		Legal	
							<120mm CL	≥120mm CL	No.	Avg C/P
1	09/05	56 43.	164 54.39	75	4	0	0	0	0	0.0
2	09/05	56 46.	164 49.53	75	4	0	0	0	1	0.3
3	09/05	56 48.	164 44.61	73	4	0	0	0	5	1.3
4	09/06	56 51.	164 40.00	73	4	0	0	0	1	0.3
5	09/06	56 53.	164 35.10	71	4	0	0	0	8	2.0
6	09/06	56 56.	164 30.34	70	4	0	0	2	4	1.0
7	09/06	56 59.	164 25.72	70	4	0	0	3	25	6.3
8	09/06	57 1.3	164 20.84	68	4	0	0	2	8	2.0
9	09/08	56 38.	164 44.88	75	4	0	0	9	32	8.0
10	09/08	56 40.	164 40.03	73	4	0	0	1	15	3.8
11	09/08	56 43.	164 35.25	71	4	0	0	6	34	8.5
12	09/08	56 46.	164 30.44	73	4	0	0	14	122	30.5
13	09/06	56 48.	164 25.61	73	4	0	16	56	193	48.3
14	09/06	56 51.	164 20.87	71	4	0	0	1	9	2.3
15	09/06	56 53.	164 16.12	71	4	0	0	3	29	7.3
16	09/06	56 57.	164 11.42	70	4	0	4	13	22	5.5
17	09/08	56 32.	164 35.24	79	4	0	0	7	37	9.3
18	09/08	56 35.	164 30.40	75	4	0	0	24	112	28.0
19	09/08	56 38.	164 25.66	75	4	0	0	2	27	6.8
20	09/08	56 40.	164 20.89	73	4	0	0	0	58	14.5
21	09/08	56 43.	164 16.10	73	4	0	1	18	192	48.0
22	09/09	56 45.	164 11.40	73	4	0	5	81	209	52.3
23	09/09	56 48.	164 6.59	71	4	0	6	138	276	69.0
24	09/09	56 51.	164 1.69	71	4	0	1	5	86	21.5
25	09/10	56 27.	164 25.72	82	2	0	0	4	12	6.0
26	09/10	56 30.	164 20.92	82	2	0	0	0	1	0.5
27	09/10	56 32.	164 16.07	79	2	0	0	0	9	4.5
28	09/10	56 35.	164 11.34	77	2	0	0	1	26	13.0
29	09/10	56 38.	164 6.47	77	2	0	3	43	60	30.0
30	09/10	56 40.	164 1.76	75	2	0	1	9	27	13.5
31	09/10	56 43.	163 57.03	73	2	0	1	54	122	61.0
32	09/10	56 46.	163 52.08	71	2	0	0	7	44	22.0
33	09/11	56 56.	163 52.21	70	2	0	0	3	32	16.0
34	09/11	56 59.	163 47.45	70	2	0	0	2	27	13.5
35	09/11	57 1.4	163 42.56	68	2	0	0	12	74	37.0
36	09/11	57 4.	163 37.85	66	2	0	0	12	76	38.0
37	09/12	57 6.7	163 32.99	66	2	0	1	14	58	29.0
38	09/12	57 9.3	163 28.33	64	2	0	0	7	26	13.0
39	09/12	57 12.	163 23.42	62	2	0	9	28	54	27.0
40	09/12	57 15.	163 18.55	59	2	2	7	33	45	22.5
41	09/12	56 51.	163 42.64	70	2	0	0	0	8	4.0
42	09/12	56 53.	163 37.78	70	2	0	0	0	8	4.0
43	09/12	56 56.	163 33.09	68	2	0	0	3	11	5.5
44	09/12	56 59.	163 28.28	66	2	0	1	9	12	6.0
45	09/12	57 1.4	163 23.41	66	2	0	2	8	53	26.5
46	09/12	57 4.1	163 18.76	64	2	0	1	10	17	8.5
47	09/12	57 6.7	163 13.89	62	2	0	3	18	56	28.0
48	09/12	57 9.4	163 9.13	62	2	1	34	81	78	39.0
49	09/13	56 45.	163 33.03	73	2	0	0	2	18	9.0
50	09/13	56 48.	163 28.27	71	2	0	0	5	15	7.5
51	09/13	56 51.	163 23.45	71	2	0	0	12	32	16.0

-Continued-

Sta- tion	Date	North Lati- tude	West Longi- tude	Depth (m)	No. of Pots Sampled	Females	Males			
							Sublegal		Legal	
							<120mm	>120mm	No.	Avg C/P
							CL	CL		
52	09/13	56 53.	163 18.68	70	2	0	0	25	46	23.0
53	09/13	56 56.	163 13.92	68	2	0	2	38	41	20.5
54	09/13	56 59.	163 9.12	68	2	1	3	29	34	17.0
55	09/13	57 1.3	163 4.48	68	2	1	5	34	53	26.5
56	09/14	57 4.1	162 59.52	68	2	0	3	56	69	34.5
57	09/14	56 40.	163 23.48	77	2	0	0	6	25	12.5
58	09/14	56 43.	163 18.67	73	2	0	0	8	20	10.0
59	09/14	56 45.	163 13.9	71	2	0	3	21	44	22.0
60	09/14	56 48.	163 9.09	70	2	0	1	9	7	3.5
61	09/14	56 51.	163 4.33	66	2	1	4	14	43	21.5
62	09/14	56 53.	162 59.55	64	2	0	2	9	16	8.0
63	09/14	56 56.	162 54.72	62	2	0	3	18	47	23.5
64	09/14	56 59.	162 49.95	60	2	36	63	78	31	15.5
65	09/14	56 35.	163 13.93	79	2	0	2	3	22	11.0
66	09/14	56 38.	163 9.09	77	2	0	1	28	44	22.0
67	09/14	56 40.	163 4.20	77	2	0	3	10	27	13.5
68	09/14	56 43.	162 59.53	73	2	0	20	37	68	34.0
69	09/26	56 45.	162 54.61	68	2	0	2	26	46	23.0
70	09/26	56 48.	162 49.72	66	2	0	3	79	157	78.5
71	09/26	56 51.	162 44.89	64	2	2	9	29	75	37.5
72	09/26	56 53.	162 40.14	66	2	0	4	31	111	55.5
73	09/26	56 30.	163 4.33	80	2	0	0	4	20	10.0
74	09/26	56 32.	162 59.48	79	2	0	1	4	16	8.0
75	09/26	56 35.	162 54.69	79	2	0	0	4	24	12.0
76	09/26	56 38.	162 49.83	79	2	0	4	17	48	24.0
77	09/25	56 40.	162 45.03	71	2	1	11	59	133	66.5
78	09/25	56 43.	162 40.23	71	2	0	5	38	115	57.5
79	09/25	56 45.	162 35.43	70	2	7	3	59	85	42.5
80	09/25	56 48.	162 30.57	68	2	5	2	16	72	36.0
81	09/26	56 24.	162 54.61	80	2	0	2	7	31	15.5
82	09/27	56 27.	162 50.01	80	2	0	0	3	13	6.5
83	09/27	56 30.	162 45.17	79	2	0	0	6	12	6.0
84	09/27	56 32.	162 40.33	79	2	0	8	15	35	17.5
85	09/27	56 35.	162 35.53	75	2	0	2	5	22	11.0
86	09/27	56 38.	162 30.75	73	2	0	2	13	38	19.0
87	09/27	56 40.	162 25.87	70	2	4	55	22	31	15.5
88	09/27	56 43.	162 21.02	70	2	14	192	81	82	41.0
89	09/29	56 19.	162 45.23	80	2	1	2	24	51	25.5
90	09/29	56 22.	162 40.40	80	2	0	3	5	23	11.5
91	09/29	56 24.	162 35.63	75	2	0	7	30	106	53.0
92	09/29	56 27.	162 30.79	75	2	2	10	39	66	33.0
93	09/29	56 30.	162 25.97	75	2	1	3	22	34	17.0
94	09/29	56 32.	162 21.17	73	2	5	7	21	38	19.0
95	09/29	56 35.	162 16.39	73	2	16	40	32	67	33.5
96	09/29	56 38.	162 11.47	73	2	4	98	63	147	73.5
97	09/30	56 14.	162 35.59	75	2	2	4	11	32	16.0
98	09/30	56 16.	162 30.83	75	2	1	1	3	18	9.0
99	09/30	56 19.	162 26.05	75	2	140	99	32	58	29.0
100	09/30	56 22.	162 21.28	70	2	125	26	30	25	12.5
101	09/30	56 24.	162 16.52	68	2	18	33	51	67	33.5
102	09/30	56 27.	162 11.70	68	2	138	31	46	83	41.5
103	09/30	56 30.	162 6.92	75	2	76	105	30	48	24.0
104	09/30	56 32.	162 2.11	71	2	245	68	17	40	20.0

-Continued-

Sta- tion	Date	North Lati- tude	West Longi- tude	Depth (m)	No. of Pots Sampled	Females	Males				
							Sublegal		Legal		
							<120mm CL	≥120mm CL	No.	Avg C/P	
105	10/01	56 8.3	162 26.02	75	2	197	5	1	7	3.5	
106	10/01	56 11.	162 21.27	77	2	0	0	0	1	0.5	
107	10/01	56 14.	162 16.48	75	2	235	56	20	27	13.5	
108	10/01	56 16.	162 11.75	79	2	201	18	8	13	6.5	
109	10/01	56 19.	162 6.99	79	2	0	0	0	1	0.5	
110	10/01	56 22.	162 2.23	82	2	0	0	1	5	2.5	
111	10/01	56 24.	161 57.38	80	2	0	0	0	3	1.5	
112	10/01	56 27.	161 52.60	84	2	0	0	1	12	6.0	
113	10/02	56 3.	162 16.45	71	2	5	0	0	0	0.0	
114	10/02	56 5.7	162 11.74	71	2	0	0	0	0	0.0	
115	10/02	56 8.3	162 7.01	73	2	0	0	0	0	0.0	
116	10/02	56 11.	162 2.21	71	2	0	0	0	0	0.0	
117	10/02	56 14.	161 57.45	73	2	0	0	0	0	0.0	
118	10/02	56 16.	161 52.66	75	2	41	3	4	2	1.0	
119	10/02	56 19.	161 47.99	75	2	1026	8	8	5	2.5	
120	10/02	56 22.	161 43.16	70	2	317	0	0	1	0.5	
121	10/02	55 58.	162 7.03	46	2	0	0	0	0	0.0	
122	10/02	56 0.3	162 2.21	51	2	5	0	0	1	0.5	
123	10/02	56 3.	161 57.43	51	2	0	0	0	0	0.0	
124	10/02	56 5.6	161 52.73	51	2	0	0	0	0	0.0	
125	10/02	56 8.3	161 47.95	55	2	0	0	0	0	0.0	
126	10/02	56 11.	161 43.12	59	2	260	1	0	0	0.0	
127	10/02	56 14.	161 38.42	59	2	559	0	0	0	0.0	
128	10/02	56 16.	161 33.36	59	2	64	0	0	0	0.0	
129	09/11	56 40.	163 42.78	73	2	0	1	6	43	21.5	
130	09/11	56 37.	163 47.62	75	2	0	0	1	43	21.5	
131	09/11	56 35.	163 52.43	77	2	0	0	2	20	10.0	
132	09/11	56 32.	163 57.22	79	2	0	0	1	29	14.5	
133	09/14	57 6.4	162 55.13	59	2	55	4	21	51	25.5	
134	10/03	56 45	163 78.80	79	2	0	0	2	6	3.0	
135	10/05	56 30.	163 42.48	80	2	0	0	0	0	0.0	
136	10/05	56 32.	163 37.73	79	2	0	0	1	4	2.0	
137	10/05	56 35.	163 32.88	77	2	0	2	1	3	1.5	
138	10/05	56 22.	163 37.65	82	2	0	0	1	13	6.5	
139	10/05	56 24.	163 32.95	82	2	0	0	2	6	3.0	
140	10/05	56 27.	163 28.00	80	2	0	0	0	4	2.0	
141	10/05	56 30.	163 23.25	79	2	0	0	1	13	6.5	
TOTAL						330	3,814	1,151	2,243	5,531	16.7

A SUMMARY OF BIOLOGICAL DATA COLLECTED DURING
THE 1992 BRISTOL BAY RED KING CRAB TEST FISHERY CHARTER



Regional Information Report No. 4K93-24

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, Alaska 99615

June 1993

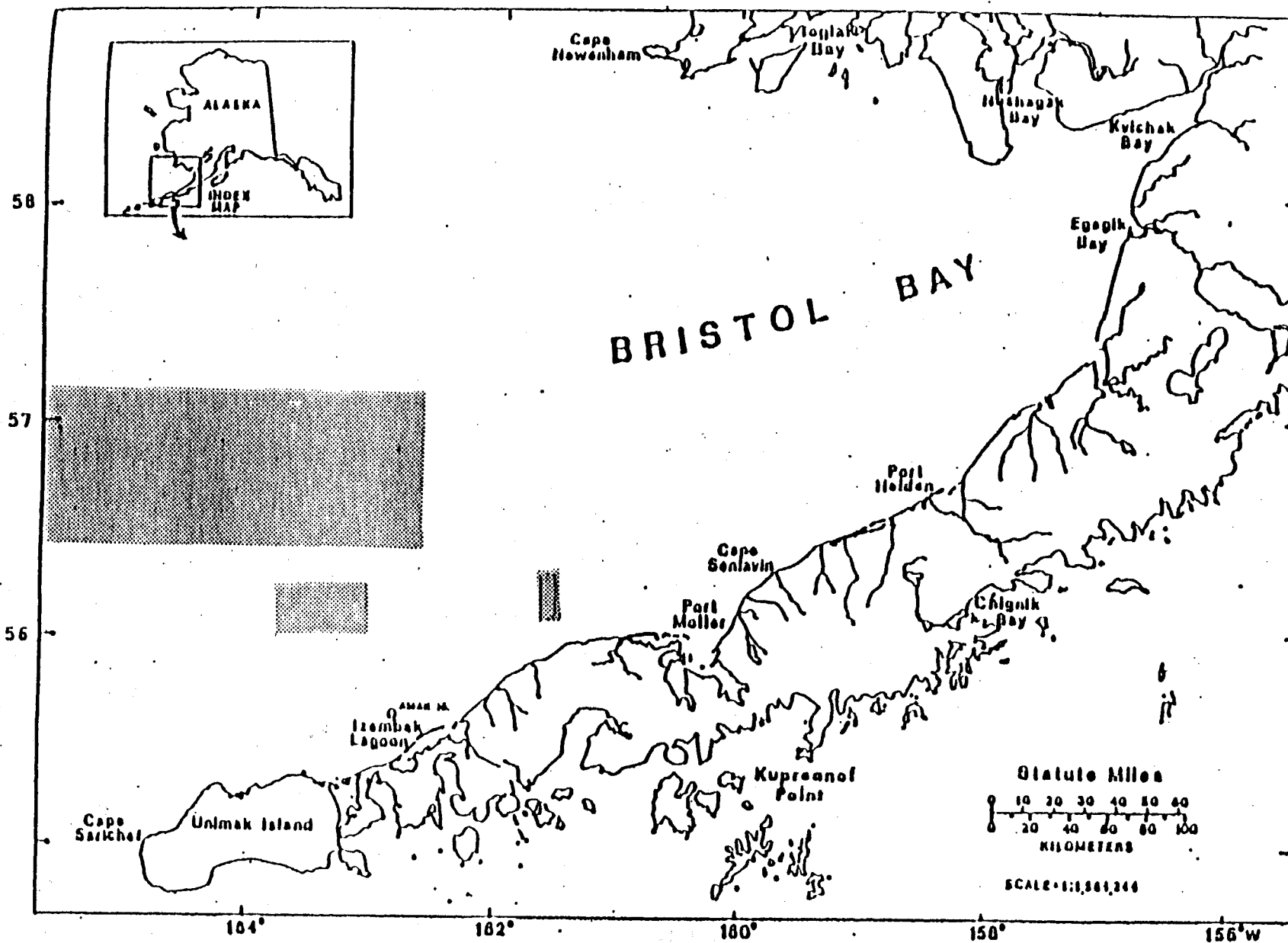


Figure 1. Location of the 1992 Bristol Bay test fishery (all shaded areas).

Summary of red king crab fishing and catch data in sampled pots in the 1992 Bristol Bay test fishery.

Pot #	Date	North Latitude		West Longitude		Depth (m)	Females	Catch Per Pot (CPUE)		
								Males		Legal No.
								Sublegal	Sublegal	
								<120mm	>120mm	
1	10/10	56	36.90	164	45.18	75	0	0	0	0
20	10/10	56	43.40	164	14.25	73	0	0	0	0
21	10/10	56	41.90	164	16.95	73	0	0	0	0
23	10/10	56	38.84	164	21.84	75	0	0	0	4
17	10/10	56	48.08	164	7.09	73	0	0	0	5
107	10/11	56	4.40	163	24.13	64	0	0	1	9
75	10/11	56	35.56	163	18.48	75	0	19	8	12
58	10/11	56	40.70	163	27.28	71	0	4	2	11
37	10/11	56	52.72	164	41.04	70	0	1	1	6
39	10/11	56	56.31	164	36.74	70	0	1	4	19
118	10/12	56	27.55	163	11.60	82	0	1	0	2
113	10/12	56	32.58	163	28.73	79	1	0	4	7
132	10/12	56	38.29	163	5.51	75	1	3	3	12
89	10/12	56	40.95	163	18.14	75	0	12	3	7
97	10/12	56	43.50	163	22.62	73	0	13	9	16
9064	10/13	56	39.04	163	23.95	75	0	4	4	14
9058	10/13	56	40.70	163	27.28	71	0	1	1	6
9054	10/13	56	41.90	163	29.86	71	0	0	3	6
9053	10/13	56	42.25	163	30.59	71	0	1	2	11
159	10/13	56	57.79	163	24.11	66	0	3	7	33
9094	10/14	56	42.50	163	20.95	73	0	4	3	17
178	10/14	56	46.27	163	29.09	71	0	1	0	3
182	10/14	56	47.20	163	29.04	71	0	1	2	5
206	10/14	56	56.91	163	5.38	64	0	1	0	9
211	10/14	56	58.33	163	44.59	62	0	4	4	4
9189	10/15	56	49.00	163	28.95	70	0	1	0	5
9194	10/15	56	50.34	163	29.03	70	0	1	1	1
9198	10/15	56	51.49	163	29.02	70	0	0	0	5
9158	10/15	56	57.68	163	24.67	66	0	1	0	12
222	10/15	56	59.02	163	26.37	66	0	0	1	7
228	10/15	56	59.56	163	29.62	66	0	0	0	14
8079	10/16	56	37.29	163	11.22	77	0	2	4	9
7069	10/16	56	37.61	163	21.25	75	0	0	0	3
8088	10/16	56	40.63	163	17.55	73	0	25	4	11
8160	10/16	56	57.86	163	23.73	66	0	0	1	4
245	10/17	56	50.88	162	57.59	66	0	8	7	39
296	10/17	56	51.27	162	45.15	66	0	7	3	23
255	10/17	56	52.33	162	55.06	64	0	11	8	46
263	10/17	56	53.40	162	53.15	62	1	3	4	21
274	10/17	56	54.15	162	46.00	62	0	2	9	27
367	10/18	56	43.70	162	46.81	70	0	1	0	11
9241	10/18	56	50.29	162	58.50	66	0	6	7	23
9257	10/18	56	52.59	162	54.56	64	0	2	10	32
361	10/18	56	54.38	162	32.61	66	0	3	7	11
354	10/18	56	54.90	162	42.90	64	1	22	13	24

-Continued-

(page 2 of 2)

Pot #	Date	North Lati- tude		West Longi- tude		Depth (m)	Females	Catch Per Pot (CPUE)		
								Males		Legal No.
								Sublegal	Sublegal	
								<120mm	≥120mm	
337	10/18	56	57.13	162	48.06	60	0	2	2	7
9273	10/19	56	54.15	162	46.31	62	0	4	7	21
9291	10/19	56	50.41	162	46.83	64	0	8	10	24
9299	10/19	56	51.74	162	43.97	66	0	0	1	3
9266	10/19	56	53.91	162	52.40	62	0	9	4	16
Total							4	192	164	617

Summary of Tanner crab fishing and catch data in sampled pots in the 1992 Bristol Bay test fishery.

Pot #	Date	North Latitude		West Longitude		Depth (m)	Females	Catch Per Pot (CPUE)	
								Males	
								Sublegal <138mm	Legal >138mm
1	10/10	56	36.90	164	45.18	75	0	4	2
20	10/10	56	43.40	164	14.25	73	3	19	2
21	10/10	56	41.90	164	16.95	73	28	33	5
23	10/10	56	38.84	164	21.84	75	1	4	4
17	10/10	56	48.08	164	7.09	73	1	12	1
107	10/11	56	4.40	163	24.13	64	0	10	4
75	10/11	56	35.56	163	18.48	75	0	29	7
58	10/11	56	40.70	163	27.28	71	0	4	4
37	10/11	56	52.72	164	41.04	70	0	12	5
39	10/11	56	56.31	164	36.74	70	2	7	3
118	10/12	56	27.55	163	11.60	82	7	5	4
113	10/12	56	32.58	163	28.73	79	16	4	7
132	10/12	56	38.29	163	5.51	75	0	14	10
89	10/12	56	40.95	163	18.14	75	0	2	8
97	10/12	56	43.50	163	22.62	73	0	3	3
9064	10/13	56	39.04	163	23.95	75	0	7	11
9058	10/13	56	40.70	163	27.28	71	0	10	9
9054	10/13	56	41.90	163	29.86	71	1	3	6
9053	10/13	56	42.25	163	30.59	71	0	7	8
159	10/13	56	57.79	163	24.11	66	0	9	14
9094	10/14	56	42.50	163	20.95	73	2	9	4
178	10/14	56	46.27	163	29.09	71	5	20	5
182	10/14	56	47.20	163	29.04	71	1	9	3
206	10/14	56	56.91	163	5.38	64	0	4	0
211	10/14	56	58.33	163	44.59	62	1	7	1
9189	10/15	56	49.00	163	28.95	70	0	2	2
9194	10/15	56	50.34	163	29.03	70	2	8	8
9198	10/15	56	51.49	163	29.02	70	0	7	1
9158	10/15	56	57.68	163	24.67	66	3	28	8
222	10/15	56	59.02	163	26.37	66	3	26	5
228	10/15	56	59.56	163	29.62	66	2	12	4
8079	10/16	56	37.29	163	11.22	77	28	14	56
7069	10/16	56	37.61	163	21.25	75	1	11	6
8088	10/16	56	40.63	163	17.55	75	1	4	1
8160	10/16	56	57.86	163	23.73	66	2	24	6
245	10/17	56	50.88	162	57.59	66	0	8	5
296	10/17	56	51.27	162	45.15	66	0	5	18
255	10/17	56	52.33	162	55.06	64	0	7	4
263	10/17	56	53.40	162	53.15	62	0	5	2
274	10/17	56	54.15	162	46.00	62	1	8	0
367	10/18	56	43.70	162	46.81	70	2	4	9
9241	10/18	56	50.29	162	58.50	66	2	15	8
9257	10/18	56	52.59	162	54.56	64	0	6	2
361	10/18	56	54.38	162	32.61	66	1	12	6

-Continued-

Pot #	Date	North Lati- tude		West Longi- tude		Depth (m)	Females	Catch Per Pot (CPUE)	
								Males	
								<u>Sublegal</u> <138mm	<u>Legal</u> ≥138mm
354	10/18	56	54.90	162	42.90	64	12	19	12
337	10/18	56	57.13	162	48.06	60	6	13	3
9273	10/19	56	54.15	162	46.31	62	3	4	1
9291	10/19	56	50.41	162	46.83	64	1	10	2
9299	10/19	56	51.74	162	43.97	66	0	8	6
9266	10/19	56	53.91	162	52.40	62	0	8	1
TOTALS							138	514	307

Appendix B.2. Forms

- Form 1. ADF&G Pilot House Log
- Form 2. ADF&G Cost Recovery Daily Tally and Cumulative Catch Record
- Form 3. ADF&G Tagging Record-Handling Mortality Study
- Form 4. ADF&G Crab Research Data Form
- Form 5. ADF&G Bristol Bay Red King Crab Tagging Record
- Form 6. ADF&G Observer Practicum Crab Collection Record
- Form 7. ADF&G Video Documentation Log
- Form 8. Red King Crab Electrophoretic Sampling Form

Vessel _____

Skipper _____

STAIN NO.

longlining pots - distance between pots on string _____ fm.

[illegible]

- * Bottom type codes: 1 - Rock; 2 - Sand; 3 - Silt; and 4 - Mud.
- ** Skipper must tell ADF&G crew if pulling gear in reverse order than set. "Lost Pot" must be recorded under "Lift Gear" section by appropriate pot which was lost. Immediately tell ADF&G deck crew whenever a pot is lost so their deck paperwork can stay in order.
- *** Circle either W=west or E=east.

ADF&G COST RECOVERY DAILY TALLY
AND CUMULATIVE CATCH RECORD[illegible]

ADF&G TAGGING RECORD HANDLING MORTALITY STUDY

FORM 3

SPECIES RED KING CRAB STRING NUMBER

 MEASURER _____

SEX MALE SEQ. TAG STATION NO.

 RECORDER _____

VESSEL CASCADE SAMPLE TYPE ☐ BUOY NUMBER _____ TAGGER _____

DATE

--	--	--	--	--

 SAMPLING FACTOR

--	--	--	--	--

 ELAPSED TIME (HR/MIN)

--	--	--	--	--

SEQUENTIAL POT NUMBER	SPECIES	SEX	CARAPACE LENGTH (MM)	LEGAL	SHELL AGE	OTHER	TAG SERIES	FLOY TAG NUMBER	COMMENTS
1		2	1						
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SAMPLE TYPE

1-Control
2-Treatment

LEGAL

1-Sublegal
2-Legal

SHELL AGE

1-Soft
2-New
3-Old
4-Very Old

OTHER

8-Shell Rust

*Add codes and
descriptions as
necessary.

ADF&G CRAB RESEARCH DATA FORM

SPECIES _____

STRING NUMBER

--	--	--	--	--	--

FORM 4 _____

SEX _____

BUOY NUMBER

--	--	--	--	--	--

RECORDER _____

VESSEL _____

TRAWL HAUL NUMBER

--	--	--	--	--	--

PAGE _____

DATE

--	--	--	--	--	--

SAMPLING FACTOR

		/			
--	--	---	--	--	--

OF _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	SEQUENTIAL POT NUMBER	SPECIES	SEX	SIZE CRABS (MM) FSH (CM)	LEGAL	SHELL AGE	EGGS				OTHER	COMMENTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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ADF&G BRISTOL BAY RED KING CRAB TAG RECOVERY FORM

SAMPLER

Observer

ADF&G

[illegible]

a/1 - Legal; 2 - Sublegal. b/ Shell Age: 0-Soft; 1-New; 2-Old; 3-Very Old. c/Fate: 1-Dead; 2-Rereleased

[illegible]

94

FORM 5

ADF&G OBSERVER PRACTICUM CRAB COLLECTION RECORD
(Onboard Collection)

RECORDER(S) _____

SEX SPECIES		DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		

SEX SPECIES		DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		

SEX SPECIES		DATE				TALLY	TOTAL	DATE				TALLY	TOTAL
		M	M	D	D			M	M	D	D		

EXAMPLE

PILOT HOUSE LOG - POT SURVEYS 1993

Vessel Cascade

Skipper GILLIGAN

STRING NO. 7

If longlining pots - distance between pots on string _____ fm.

TAG POT ?	SET GEAR			DEPTH IN FMS.	BOTTOM TYPE -	SEQUENTIAL POT NO.	BOUY NO.	LIFT GEAR **			LATITUDE - N		LONGITUDE - W or E***		LATITUDE - N		LONGITUDE - W or E***		C/P ≥ 6.0"	
	MONTH	DAY	MILITARY TIME					MONTH	DAY	MILITARY TIME	DEG	MINUTES	DEG	MINUTES	DEG	MINUTES	DEG	MINUTES		
	9	27	1000	40	4	25	TX	9	29	1210	56	30	70	163	52	10			35	
			1005			26	LA	9	29	1219	56	30	90	163	52	30			26	
✓			1007			27	RY	9	29	1225	56	31	10	163	52	50	56	32	30	17
✓	✓		1009			28	102	9	29	1320	56	31	15	163	52	55	56	33	50	38
STRING 8																				
									</											

* Bottom type codes: 1 - Rock; 2 - Sand; 3 - Silt; and 4 - Mud.

** Skipper must tell ADF&G crew if pulling gear in reverse order than set. "Lost Pot" must be recorded under "Lift Gear" section by appropriate pot which was lost. Immediately tell ADF&G deck crew whenever a pot is lost so their deck paperwork can stay in order.

*** Circle either W=west or E=east.

SPECIES RED KING CRAB STRING NUMBER 7 MEASURER Tracey
 SEX MALE SEQ. TAG STATION NO. 1 RECORDER Hobart
 VESSEL CASCADE SAMPLE TYPE 1 BUOY NUMBER 8Y TAGGER Byersdorfer
 DATE 9-29-93 SAMPLING FACTOR 30/51 ELAPSED TIME (HR/MIN) 1/43

	SEQUENTIAL POT NUMBER		SPECIES	SEX	CARAPACE LENGTH (MM)		LEGAL	SHELL AGE	OTHER	TAG SERIES	FLOY TAG NUMBER			COMMENTS (Control Pot)
1		27		2	1	144	2	2	2	A		101		
2						139		2				102		
3						167		3				103		
4						171		4				104		
5						135		2				105		
6						161		2				106		
7						153		2				107		
8						142		2				108		
9						149		3				109		
10						138		2				111	(#110 tag is missing)	
11						137		2				112		
12						163		3				113		
13						147		2				114		
14						145		2				115		
15						138		2	2			116		
16						137		2				117		
17						140		3				118		
18						145		3				119		
19						144		2				120		
20						150		2				121		
21						153		2				122		
22						167		3	2			123		
23						139		2				124		
24						149		2	2			125		
25						160		3	2			126	(cont next page)	

SAMPLE TYPE
 1-Control
 2-Treatment

LEGAL
 1-Sublegal
 2-Legal

SHELL AGE
 1-Soft
 2-New
 3-Old
 4-Very Old

OTHER
 8-Shell Rust
 *Add codes and
 descriptions as
 necessary.

Appendix B.3. Table of Random Digits

TABLE A I
TEN THOUSAND RANDOMLY ASSORTED DIGITS

	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
00	54463	22662	65905	70639	79365	67382	29085	69831	47058	08186
01	15389	85205	18850	39226	42249	90669	96325	23248	60933	26927
02	85941	40756	82414	02015	13858	78030	16269	65978	01385	15345
03	61149	69440	11286	88218	58925	03638	52862	62733	33451	77455
04	05219	81619	10651	67079	92511	59888	84502	72095	83463	75577
05	41417	98326	87719	92294	46614	50948	64886	20002	97365	30976
06	28357	94070	20652	35774	16249	75019	21145	05217	47286	76305
07	17783	00015	10806	83091	91530	36466	39981	62481	49177	75779
08	40950	84820	29881	85966	62800	70326	84740	62660	77379	90279
09	82995	64157	66164	41180	10089	41757	78258	96488	88629	37231
10	96754	17676	55659	44105	47361	34833	86679	23930	53249	27083
11	34357	88040	53364	71726	45690	66334	60332	22554	90600	71113
12	06318	37403	49927	57715	50423	67372	63116	48888	21505	80182
13	62111	52820	07243	79931	89292	84767	85693	73947	22278	11551
14	47534	09243	67879	00544	23410	12740	02540	54440	32949	13491
15	98614	75993	84460	62846	59844	14922	48730	73443	48167	34770
16	24856	03648	44898	09351	98795	18644	39765	71058	90368	44104
17	96887	12479	80621	66223	86085	78285	02432	53342	42846	94771
18	90801	21472	42815	77408	37390	76766	52615	32141	30268	18106
19	55165	77312	83666	36028	28420	70219	81369	41943	47366	41067
20	75884	12952	84318	95108	72305	64620	91318	89872	45375	85436
21	16777	37116	58550	42958	21460	43910	01175	87894	81378	10620
22	46230	43877	80207	88877	89380	32992	91380	03164	98656	59337
23	42902	66892	46134	01432	94710	23474	20423	60137	60609	13119
24	81007	00333	39693	28039	10154	95425	39220	19774	31782	49037
25	68089	01122	51111	72373	06902	74373	96199	97017	41273	21546
26	20411	67081	89950	16944	93054	87687	96693	87236	77054	33848
27	58212	13160	06468	15718	82627	76999	05999	58680	96739	63700
28	70577	42866	24969	61210	76046	67699	42054	12696	93758	03283
29	94522	74358	71659	62038	79643	79169	44741	05437	39038	13163
30	42626	86819	85651	88678	17401	03252	99547	32404	17918	62880
31	16051	33763	57194	16752	54450	19031	58580	47629	54132	60631
32	08244	27647	33851	44705	94211	46716	11738	55784	95374	72655
33	59497	04392	09419	89964	51211	04894	72882	17805	21896	83864
34	97155	13428	40293	09985	58434	01412	69124	82171	59058	82859
35	98409	66162	95763	47420	20792	61527	20441	39435	11859	41567
36	45476	84882	65109	96597	25930	66790	65706	61203	53634	22557
37	89300	69700	50741	30329	11658	23166	05400	66669	48708	03887
38	50051	95137	91631	66315	91428	12275	24816	68091	71710	33258
39	31753	85178	31310	89642	98364	02306	24617	09609	83942	22716
40	79152	53829	77250	20190	56535	18760	69942	77448	33278	48805
41	44560	38750	83635	56540	64900	42912	13953	79149	18710	68618
42	68328	83378	63369	71381	39564	05615	42451	64559	97501	65747
43	46939	38689	58625	08342	30459	85863	20781	09284	26333	91777
44	83544	86141	15707	96256	23068	13782	08467	89469	93842	55349
45	91621	00881	04900	54224	46177	55309	17852	27491	89415	23466
46	91896	67126	04151	03795	59077	11848	12630	98375	52068	60142
47	55751	62515	21108	80830	02263	29303	37204	96926	30506	09808
48	85156	87689	95493	88842	00664	55017	55539	17771	69448	87530
49	07521	56898	12236	60277	39102	62315	12239	07105	11844	01117

and 18 *df.* Find the
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0.16

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ading	Square Root
7.76	77.6
1.99	19.9
5.81	6.81
4.40	0.440
1.99	0.0299

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3 is 0.0299 as shown.

TABLE A 1—(Continued)

	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	
00	59391	58030	52098	82718	87024	82848	04190	96574	90464	29065	50
01	99567	76364	77204	04615	27062	96621	43918	01896	83991	51141	51
02	10363	97518	51400	25670	98342	61891	27101	37855	06235	33316	52
03	86859	19558	64432	16706	99612	59798	32803	67708	15297	28612	53
04	11258	24591	36863	55368	31721	94335	34936	02566	80972	08188	54
05	95068	88628	35911	14530	33020	80428	39936	31855	34334	64865	55
06	54463	47237	73800	91017	36239	71824	83671	39892	60518	37092	56
07	16874	62677	57412	13215	31389	62233	80827	73917	82802	84420	57
08	92494	63157	76593	91316	03505	72389	96363	52887	01087	66091	58
09	15669	56689	35682	40844	53256	81872	35213	09840	34471	74441	59
10	99116	75486	84989	23476	52967	67104	39495	39100	17217	74073	60
11	15696	10703	65178	90637	63110	17622	53988	71087	84148	11670	61
12	97720	15369	51269	69620	03388	13699	33423	67453	43269	56720	62
13	11666	13841	71681	98000	35979	39719	81899	07449	47985	46967	63
14	71628	73130	78783	75691	41632	09847	61547	18707	85489	69944	64
15	40501	51089	99943	91843	41995	88931	73631	69361	05375	15417	65
16	22518	55576	98215	82068	10798	86211	36584	67466	69373	40054	66
17	75112	30485	62173	02132	14878	92879	22281	16783	86352	00077	67
18	80327	02671	98191	84342	90813	49268	95441	15496	20168	09271	68
19	60251	45548	02146	05597	48228	81366	34598	72856	66762	17002	69
20	57430	82270	10421	00540	43648	75888	66049	21511	47676	33444	70
21	73528	39559	34434	88596	54086	71693	43132	14414	79949	85193	71
22	25991	65959	70769	64721	86413	33475	42740	06175	82758	66248	72
23	78388	16638	09134	59980	63806	48472	39318	35434	24057	74739	73
24	12477	09965	96657	57994	59439	76330	24596	77515	09577	91871	74
25	83266	32883	42451	15579	38155	29793	40914	65990	16255	17777	75
26	76970	80876	10237	39515	79152	74798	39357	09054	73579	92359	76
27	37074	65198	44785	68624	98336	84481	97610	78735	46703	98265	77
28	83712	06514	30101	78295	54656	85417	43189	60048	72781	72606	78
29	20287	56862	69727	94443	64936	08366	27227	05158	50326	59566	79
30	74261	32592	86538	27041	65172	85532	07571	80609	39285	65340	80
31	64081	49863	08478	96001	18888	14810	70545	89755	59064	07210	81
32	05617	75818	47750	67814	29575	10526	66192	44464	27058	40467	82
33	26793	74951	95466	74307	13330	42664	85515	20632	05497	33625	83
34	65988	72850	48737	54719	52056	01596	03845	35067	03134	70322	84
35	27366	42271	44300	73399	21105	03280	73457	43093	05192	48657	85
36	56760	10909	98147	34736	33863	95256	12731	66598	50771	83665	86
37	72880	43338	93643	58904	59543	23943	11231	83268	65938	81581	87
38	77888	38100	03062	58103	47961	83841	25878	23746	55903	44115	88
39	28440	07819	21580	51459	47971	29882	13990	29226	23608	15873	89
40	63525	94441	77033	12147	51054	49955	58312	76923	96071	05813	90
41	47606	93410	16339	89033	89696	47231	64498	31776	05383	39902	91
42	52669	45030	96279	14709	52372	87832	02735	50803	72744	88208	92
43	16738	60159	07425	62369	07515	82721	37875	71153	21315	00132	93
44	59348	11695	45751	15865	74739	05572	32688	20271	65128	14551	94
45	12900	71775	29845	60774	94924	21810	38636	33717	67598	82521	95
46	75086	23537	49939	33595	13484	97588	28617	17979	70749	35234	96
47	99495	51434	29181	09993	38190	42553	68922	52125	91077	40197	97
48	26075	31671	45386	36583	93459	48599	52022	41330	60651	91321	98
49	13636	93596	23377	51133	95126	61496	42474	45141	46660	42338	99

TABLE A 1—(Continued)

85-89	90-94	95-99		00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
96574	90464	29065	50	64249	63664	39652	40646	97306	31741	07294	84149	46797	82487
01896	83991	51141	51	26538	44249	04050	48174	65570	44072	40192	51153	11397	58212
37855	06235	33316	52	05845	00512	78630	55328	18116	69296	91705	86224	29503	57071
67708	15297	28612	53	74897	68373	67359	51014	33510	83048	17056	72506	82949	54600
02566	80972	08188	54	20872	54570	35017	88132	25730	22626	86723	91691	13191	77212
			55	31432	96156	89177	75541	81355	24480	77243	76690	42507	84362
31855	34134	64865	56	66890	61505	01240	00660	05873	13568	76082	79172	57913	93448
39892	60518	37092	57	41894	57790	79970	33106	86904	48119	52503	24130	72824	21627
73917	82802	84420	58	11303	87118	81471	52936	08555	28420	49416	44448	04269	27029
52887	01087	66091	59	54374	57325	16947	45356	78371	10563	97191	53798	12693	27928
09840	34471	74441											
			60	64852	34421	61046	90849	13966	39810	42699	21753	76192	10508
39100	17217	74073	61	16309	20384	09491	91588	97720	89846	30376	76970	23063	35894
71087	84148	11670	62	42587	37065	24526	72602	57589	98131	37292	05967	26002	51945
67453	43269	56720	63	40177	98590	97161	41682	84533	67588	62036	49967	01990	72308
07449	47985	46967	64	82309	76128	93965	26743	24141	04838	40254	26065	07938	76236
18707	85489	69944											
			65	79788	68243	59732	04257	27084	14743	17520	95401	55811	76099
69361	05375	15417	66	40538	79000	89559	25026	42274	23489	34502	75508	06059	86682
67466	69373	40054	67	64016	73598	18609	73150	62463	33102	45205	87440	96767	67042
16783	86352	00077	68	49767	12691	17903	93871	99721	79109	09425	26904	07419	76013
15496	20168	09271	69	76974	55108	29795	08404	82684	00497	51126	79935	57450	55671
72856	66762	17002											
			70	23854	08480	85983	96025	50117	64610	99425	62291	86943	21541
21511	47676	33444	71	68973	70551	25098	78033	98573	79848	31778	29555	61446	23037
14414	79949	85193	72	36444	93600	65350	14971	25325	00427	52073	64280	18847	24768
06175	82758	66248	73	03003	87800	07391	11594	21196	00781	32550	57158	58887	73041
35434	24057	74739	74	17540	26188	36647	78386	04558	61463	57842	90382	77019	24210
77515	09577	91871											
			75	38916	55809	47982	41968	69760	79422	80154	91486	19180	15100
65990	16255	17777	76	64288	19843	69122	42502	48508	28820	59933	72998	99942	10515
09054	73579	92359	77	86809	51564	38040	39418	49915	19000	58050	16899	79952	57849
78735	46703	98265	78	99800	99566	14742	05028	30033	94889	53381	23656	75787	59223
60048	72781	72606	79	92345	31890	95712	08279	91794	94068	49337	88674	35355	12267
05158	50326	59566											
			80	90363	65162	32245	82279	79256	80834	06088	99462	56705	06118
80609	39285	65340	81	64437	32242	48431	04835	39070	59702	31508	60935	22390	52246
89755	59064	07210	82	91714	53662	28373	34333	55791	74758	51144	18827	10704	76803
44464	27058	40467	83	20902	17646	31391	31459	33315	03444	55743	74701	58851	27427
20632	05497	33625	84	12217	86007	70371	52281	14510	76094	96579	54853	78339	20839
35067	03134	70322											
			85	45177	02863	42307	53571	22532	74921	17735	42201	80540	54721
43093	05192	48657	86	28325	90814	08804	52746	47913	54577	47525	77705	95330	21866
66598	50771	83665	87	29019	28776	56116	54791	64604	08815	46049	71186	34650	14994
83268	65938	81581	88	84979	81353	56219	67062	26146	82567	33122	14124	46240	92973
23746	55903	44115	89	50371	26347	48513	63915	11158	25563	91915	18431	92978	11591
29226	23608	15873											
			90	53422	06825	69711	67950	64716	18003	49581	45378	99878	61130
76923	96071	05813	91	67453	35651	89316	41620	32048	70225	47597	33137	31443	51445
31776	05383	39902	92	07294	85353	74819	23445	68237	07202	99515	62282	53809	26685
50803	72744	88208	93	79544	00302	45338	16015	66613	88968	14595	63836	77716	79596
71153	21315	00132	94	64144	85442	82060	46471	24162	39500	87351	36637	42833	71875
20271	65128	14551											
			95	90919	11883	58318	00042	52402	28210	34075	33272	00840	73268
33717	67598	82521	96	06670	57353	86275	92276	77591	46924	60839	55437	03183	13191
17979	70749	35234	97	36634	93976	52062	83678	41256	60948	18685	48992	19462	96062
52125	91077	40197	98	75101	72891	85745	67106	26010	62107	60885	37503	55461	71213
41330	60651	91321	99	05112	71222	72654	51583	05228	62056	57390	42746	39272	96659
45141	46660	42338											

TABLE A 1—(Continued)

	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99
50	32847	31282	03345	89593	69214	70381	78285	20054	91018	16742
51	16916	00041	30236	55023	14253	76582	12092	86533	92426	37655
52	66176	34037	21005	27137	03193	48970	64625	22394	39622	79085
53	46299	13335	12180	16861	38043	59292	62675	63631	37020	78195
54	22847	47839	45385	23289	47526	54098	45683	55849	51575	64689
55	41851	54160	92320	69936	34803	92479	33399	71160	64777	83378
56	28444	59497	91586	95917	68553	28639	06455	34174	11130	91994
57	47520	62378	98855	83174	13088	16561	68559	26679	06238	51254
58	34978	63271	13142	82681	05271	08822	06490	44984	49307	61717
59	37404	80416	69035	92980	49486	74378	75610	74976	70056	15478
60	32400	65482	52099	53676	74648	94148	65095	69597	52771	71551
61	89262	86332	51718	70663	11623	29834	79820	73002	84886	03591
62	86866	09127	98021	03871	27789	58444	44832	36505	40672	30180
63	90814	14833	08759	74645	05046	94056	99094	65091	32663	73040
64	19192	82756	20553	58446	55376	88914	75096	26119	83898	43816
65	77585	52593	56612	95766	10019	29531	73064	20953	53523	58136
66	23757	16364	05096	03192	62386	45389	85332	18877	55710	96459
67	45989	96257	23850	26216	23309	21526	07425	50254	19455	29315
68	92970	94243	07316	41467	64837	52406	25225	51553	31220	14032
69	74346	59596	40088	98176	17896	86900	20249	77753	19099	48885
70	87646	41309	27636	45153	29988	94770	07255	70908	05340	99751
71	50099	71038	45146	06146	55211	99429	43169	66259	97786	59180
72	10127	46900	64984	75348	04115	33624	68774	60013	35515	62556
73	67995	81977	18984	64091	02785	27762	42529	97144	80407	64524
74	26304	80217	84934	82657	69291	35397	98714	35104	08187	48109
75	81994	41070	56642	64091	31229	02595	13513	45148	78722	30144
76	59537	34662	79631	89403	65212	09975	06118	86197	58208	16162
77	51228	10937	62396	81460	47331	91403	95007	06047	16846	64809
78	31089	37995	29577	07828	42272	54016	21950	86192	99046	84864
79	38207	97938	93459	75174	79460	55436	57206	87644	21296	43393
80	88666	31142	09474	89712	63153	62333	42212	06140	42594	43671
81	53365	56134	67582	92557	89520	33452	05134	70628	27612	33738
82	89807	74530	38004	90102	11693	90257	05500	79920	62700	43325
83	18682	81038	85662	90915	91631	22223	91588	80774	07716	12548
84	63571	32579	63942	25371	09234	94592	98475	76884	37635	33608
85	68927	56492	67799	95398	77642	54913	91583	08421	81450	76229
86	56401	63186	39389	88798	31356	89235	97036	32341	33292	73757
87	24333	95603	02359	72942	46287	95382	08452	62362	97869	71775
88	17025	84202	95199	62272	06366	16175	97577	99304	41587	03686
89	02804	08253	52133	20224	68034	50865	57868	22343	55111	03607
90	08298	03879	20995	19850	73090	13191	18963	82244	78479	99121
91	59883	01785	82403	96062	03785	03488	12970	64896	38336	30030
92	46982	06682	62864	91837	74021	89094	39952	64158	79614	78235
93	31121	47266	07661	02051	67599	34471	69843	83696	71402	76287
94	97867	56641	63416	17577	30161	87320	37752	73276	48969	41915
95	57364	86746	08415	14621	49430	22311	15836	72492	49372	44103
96	09559	26263	69511	28064	75999	44540	13337	10918	79846	54809
97	53873	55571	00608	42661	91332	63956	74087	59008	47493	99581
98	35531	19162	86406	05299	77511	24311	57257	22826	77555	05941
99	28229	88629	25695	94932	30721	16197	78742	34974	97528	45447

Appendix B.4. List of Equipment

1. Survival suit with EPIRB and strobe attached
2. Rain gear, gloves and boots
3. Float suit if on deck in rough weather
4. EPIRB and Strobe
5. Personal items
6. Forms:
 - a. Pilot House Log (50)
 - b. Tagging Record (300)
 - c. Crab Research Data Form (500)
 - d. Tag Recovery Form (10)
 - e. Cost Recovery Tally (5)
 - f. Observer Practicum Record (5)
 - g. PIT Tag Tail Section Specimen Labels
 - h. DEC PSP Collection Labels
7. Wire for tagging needles
8. Pliers for crimping tag swedges
9. Bottle of Betadine (for tagging needle disinfectant, also good bacterial scrub after a day on deck)
10. Stopwatches (2)
11. 1 pair small (6") dial calipers
12. 4 pair large calipers (3 from Kodiak, 1 from Dutch)
13. 6 inch and 6.5 inch measuring sticks
14. film and camera (Take Donn's)
15. video camera and tapes (optional)
16. Rite-in-Rain notebooks (5)
17. pencils (2 doz. sharpened)
18. paper clips (ass't)
19. rubber bands
20. manila envelopes for data (1 legal-size, 12 regular)
21. permanent markers (1 large black; 1 ea small black, red)
22. clipboard(s) 1 legal size for captain; 6-8 regular size
23. calculator w/batteries
24. tallywackers (3)
25. Biosonics PIT tag hand-held reader (find one that works and charge battery before you go.
26. One can WD40
27. statcharts (2); one for captain, one for biological crew.
28. timesheets (10)
29. code sheet for cost recovery catch reporting (get from Morrison)
30. cable/electrical ties (150)
31. Tanner disc tags w/dart removed (150)

Appendix B.5. Calendar

1993

October

1993

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				30 FV CASCADE DEPARTS DUTCH HARBOR	1 <i>day 1</i>	2 <i>day 2</i>
3 <i>day 3</i>	4 <i>day 4</i>	5 <i>day 5</i>	6 <i>day 6</i>	7 <i>day 7</i>	8 <i>day 8</i>	9 <i>day 9</i>
10 <i>day 10</i>	11 <i>day 11</i> Columbus Day Thanksgiving Day (Canada)	12 <i>day 12</i>	13 <i>day 13</i>	14 <i>day 14</i>	15 <i>day 15</i>	16 <i>day 16</i>
17 <i>day 17</i>	18 <i>day 18</i>	19 <i>day 19</i>	20 <i>day 20</i>	21 <i>END day 21</i> BRISTOL BAY CHARTER PRACTICUM 9am Delaware Westland	22 ²⁹⁵	23 ²⁹⁶
24 ²⁹⁷	25 ²⁹⁸	26 ²⁹⁹	27 ³⁰⁰	28 ³⁰¹	29 ³⁰²	30 ³⁰³
31						

Daylight Saving Time Ends

JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS	SMTWTFS
1 2	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3	1	1 2 3 4 5	1 2 3	1 2 3 4 5 6 7	1 2 3 4	1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9 10 11 12 13
3 4 5 6 7 8 9	7 8 9 10 11 12 13	7 8 9 10 11 12 13	4 5 6 7 8 9 10	2 3 4 5 6 7 8	6 7 8 9 10 11 12	4 5 6 7 8 9 10	8 9 10 11 12 13 14	5 6 7 8 9 10 11	3 4 5 6 7 8 9	7 8 9 10 11 12 13	5 6 7 8 9 10 11 12 13
10 11 12 13 14 15	14 15 16 17 18 19 20	14 15 16 17 18 19 20	11 12 13 14 15 16	9 10 11 12 13 14 15	13 14 15 16 17 18 19	11 12 13 14 15 16 17	15 16 17 18 19 20 21	12 13 14 15 16 17 18	10 11 12 13 14 15 16	14 15 16 17 18 19 20	12 13 14 15 16 17 18
16 17 18 19 20 21 22	21 22 23 24 25 26 27	21 22 23 24 25 26 27	16 17 18 19 20 21 22	16 17 18 19 20 21 22	20 21 22 23 24 25 26	18 19 20 21 22 23 24	22 23 24 25 26 27 28	19 20 21 22 23 24 25	17 18 19 20 21 22 23	21 22 23 24 25 26 27	19 20 21 22 23 24 25
23 24 25 26 27 28 29 30 31	28	28 29 30 31	25 26 27 28 29 30	23 24 25 26 27 28 29	27 28 29	25 26 27 28 29 30 31	29 30 31	26 27 28 29 30	24 25 26 27 28 29 30	28 29 30	26 27 28 29 30 31
31									31		

OCTOBER 1993

Appendix B.6. Contract between the State of Alaska and
the FV Cascade

**CONTRACT
AWARD**

STATE OF ALASKA
DIVISION OF GENERAL SERVICES (Contracting Authority)
33C Willoughby Ave., 7th Floor
P.O. Box 110218
Juneau, AK 99811-0218

CONTRACT AWARD NUMBER

C.A. 26924

ORDERING DEPT:		COMMODITY CODE		DATE OF CONTRACT	
Alaska Department of Fish and Game ATTN: Leslie Watson 211 Mission Road Kodiak, AK 99516		821-01		June 21, 1993	
		NUMBER AND PERIOD OF RENEWAL OPTIONS		REQUISITION NO./DATE ASSIGNED	
				11-371-93	
		DATE INITIAL CONTRACT BEGINS		DATE INITIAL CONTRACT ENDS	
		Approximately 09/29/93		Approximately 10/21/93	
COMPANY CONTACT NAME	TELEPHONE NUMBER	GS Vendor Code	AWARD ISSUED IN		
Robert Miller	(206) 256-1510	99999	ACCORDANCE WITH: BID # 13633		
TO CONTRACTOR			PRICE ADJ. REQ. PRIOR TO EACH		CPI/PII BASE INDEX POINTS & Month/Year
			N/A		N/A
Cascade Boat Co. 3214 West McGraw Street, Suite 300 Seattle, WA 98199			REVIEW DATE (MM/YY/YY)		RENEWALS EXP. DATE (MM/YY/YY)
			March 1994		N/A
			ESTIMATED VALUE OF INITIAL TERM		RENEWAL (MONTHS/YEAR)
			\$37,800.00		April 1994

SEND INVOICE IN DUPLICATE TO: ☒ Ordering Department or ☐ as specified in description

NOTE: This order constitutes a binding commitment between the state and the contractor listed hereon. Unauthorized modification without the expressed prior approval of the contracting authority will result in a financial obligation on the contractor and/or unauthorized state personnel making the change.

DESCRIPTION

Furnish the State of Alaska, Department of Fish and Game with vessel charter services in accordance with Invitation to Bid (ITB) 13633.

VESSEL NAME: CASCADE #557441

CONTRACT RATE: \$1,800.00/Day (Approximately 21 days)

LETTER OF INSPECTION: Before the first day of charter, the Contractor must furnish the Department of Fish and Game with a Letter of Inspection issued by the U.S. Coast Guard.

Post-It™ brand fax transmittal memo 7671 # of pages = 15

To	LESLIE WATSON	From	MARK O'BRIEN
Co.		Co.	
Dept.		Phone #	
Fax #	486-4969	Fax #	

IMPORTANT

1. CONTRACT AWARD NUMBER AND ORDERING DEPARTMENT NAME MUST APPEAR ON ALL INVOICES AND DOCUMENTS RELATING TO THIS ORDER.

2. THE STATE IS REGISTERED FOR TAX FREE TRANSACTIONS UNDER CHAPTER 32, IRS CODE REGISTRATION NO. 22-401133. ITEMS ARE FOR THE EXCLUSIVE USE OF THE STATE AND NOT FOR RESALE.

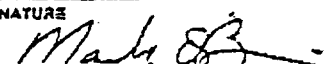
CONTRACTING AUTHORITY'S NAME

Mark O'Brien

TELEPHONE NUMBER

(907) 465-2253

SIGNATURE



PAGE 1 OF

1 PAGES

MAY-28-1993 16:19 FROM

CASCADE BOAT CO.

TO

COMMERCIAL FISHING 2
19374652199 P.62

INVITATION TO BID

INVITATION NUMBER
13633RETURN THIS BID TO:
State of Alaska
Division of General Services
333 Willoughby Street
P.O. Box 110210
Juneau, Alaska 99811-0210

THIS IS NOT AN ORDER

DATE ITS ISSUED: 05/11/93

SEALED BIDS WILL BE RECEIVED IN SINGLE COPY AT THE ABOVE ADDRESS UNTIL
1:30 PM ON 05/01/93 AT WHICH TIME THEY WILL BE PUBLICLY OPENED.

DELIVERY LOCATION: See Text.

DELIVERY DATE: See Text.

FOB POINT: FINAL DESTINATION

**** IT IS NOT NECESSARY TO RETURN THIS FORM IF YOU DO NOT WISH TO BID ****

BID TITLE: BRISTOL BAY RED KING CRAB VESSEL CHARTER FOR THE DEPARTMENT OF
FISH & GAME, DUTCH HARBOR, AK.

BIDDER'S NOTICE: By signature on this form, the bidders certify that: (1) the bidder has a valid Alaska business license and has written the license number below or has submitted one of the following forms of evidence of an Alaska business license with the bid: (a) a cancelled check for the business license fee; (b) a copy of a business license application with a receipt date stamp from the state's business license office; (c) a receipt from the state's business license office for the license fee; (d) a copy of the bidder's valid business license; (e) a sworn notarized affidavit that the bidder has applied and paid for a business license; (2) the price(s) submitted was arrived at independently and without collusion and that the bidder is complying with: (a) the laws of the State of Alaska; (b) the applicable portion of the Federal Civil Rights Act of 1964; (c) the Equal Employment Opportunity Act and the regulations issued thereunder by the state and Federal Government; and (d) all terms and conditions set out in this Invitation to Bid (ITS). If any bidder fails to comply with (1) or (2) of this paragraph, the state may reject the bid, terminate the contract, or consider the contractor in default.

Mark O'Brien
MARK O'BRIEN
CONTRACTING OFFICER

TELEPHONE NUMBER
(907) 465-2253

Fax - (907) 465-2189

CASCADE BOAT CO.

COMPANY SUBMITTING BID

Robert W. Miller
AUTHORIZED SIGNATURE

ROBERT W. MILLER
PRINTED NAME

5-28-93
DATE

153754
ALASKA BUSINESS LICENSE #

DOES YOUR BUSINESS
QUALIFY FOR THE ALASKA
BIDDER'S PREFERENCE?
☐ YES ☒ NO
SEE ITS FOR EXPLANATION
OF CRITERIA TO QUALIFY.

91-0906481

VENDOR TAX I.D. #

(206) 286-1810
TELEPHONE #

PAGE 1 OF 14 PAGES
REV 5/19/92

STANDARD TERMS AND CONDITIONS

INSTRUCTIONS TO BIDDERS:

1. INVITATION TO BID (ITS) REVIEW: Bidders shall carefully review this ITS for defects and questionable or objectionable material. Bidders' comments concerning defects and questionable or objectionable material in the ITS must be made in writing and received by the purchasing authority at least ten (10) days before the bid opening date. This will allow time for an amendment to be issued if one is required. It will also help prevent the opening of a defective bid, upon which award cannot be made, and the resultant exposure of bidders' prices. Bidders' original comments should be sent to the purchasing authority listed on the front of this ITS.

2. BID FORMS: Bidders shall use this and attached forms in submitting bids. A photocopied bid may be submitted.

3. SUBMITTING BIDS: Envelopes containing bids must be sealed, marked, and addressed as shown in the example below. Do not put the ITS number and opening date on the envelope of a request for bid information. Envelopes with ITS numbers annotated on the outside will not be opened until the scheduled date and time.

Bidder's Return Address

Department of Administration
Division of General Services
P.O. Box 110210
Juneau, AK 99811-0210

ITS No.: _____

Opening Date: _____

4. PRICES: The bidder shall state prices in the units of issue on this ITS. Prices quoted for commodities must be in U.S. funds and include applicable federal duty, brokerage fees, packaging, and transportation cost to the FOB point so that upon transfer of title the commodity can be utilized without further cost. Prices quoted for services must be quoted in U.S. funds and include applicable federal duty, brokerage fee, packaging, and transportation cost so that the services can be provided without further cost. Prices quoted in bids must be exclusive of federal, state, and local taxes. If the bidder believes that certain taxes are payable by the state, the bidder may list such taxes separately, directly below the bid price for the affected item. The state is exempt from Federal Excise Tax.

5. VENDOR TAX ID NUMBER: If goods or services procured through this ITS are of a type that is required to be included on a Miscellaneous Tax Statement, as described in the Internal Revenue Code, a valid tax identification number must be provided to the State of Alaska before payment will be made.

6. FILING A PROTEST: A bidder may protest the award of a contract or the proposed award of a contract for supplies, services, or professional services. The protest must be filed in writing and include the following information: (1) the name, address, and telephone number of the protester; (2) the signature of the protester or the protester's representative; (3) identification of the contracting agency and the solicitation or contract at issue; (4) a detailed statement of the legal and factual grounds of the protest, including copies of relevant documents; and (5) the form of relief requested. Protests will be treated in accordance with Alaska Statutes (AS) 25.50.560-25.50.910.

CONDITIONS:

1. AUTHORITY: This ITS is written in accordance with AS 38.30 and 2 AAC 12.

2. COMPLIANCE: In the performance of a contract that results from this ITS, the contractor must comply with all applicable federal, state, and borough regulations, codes, and laws; and be liable for all required insurance, licenses, permits and bonds; and pay all applicable federal, state, and borough taxes.

3. SUITABLE MATERIALS, ETC.: Unless otherwise specified, all materials, supplies or equipment offered by a bidder shall be new, unused, and of the latest edition, version, model or crop and of recent manufacture.

4. SPECIFICATIONS: Unless otherwise specified in the ITS, product brand names or model numbers specified in this ITS are examples of the type and quality of product required, and are not statements of preference. If the specifications describing an item conflict with a brand name or model number describing the item, the specifications govern. Reference to brand name or number does not preclude an offer of a comparable or better product. If full specifications and descriptive literature are provided for the product. Failure to provide such specifications and descriptive literature may be cause for rejection of the offer.

MAY-29-1993 16:19 FROM CASCADE BOAT CO.

TO

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(3)

STANDARD TERMS AND CONDITIONS

5. **FIRM OFFER:** For the purpose of award, offers made in accordance with this ITB must be good and firm for a period of ninety (90) days from the date of bid opening.
6. **EXTENSION OF PRICES:** In case of error in the extension of prices in the bid, the unit prices will govern; in a lot bid, the lot prices will govern.
7. **BID PREPARATION COSTS:** The state is not liable for any costs incurred by the bidder in bid preparation.
8. **CONSOLIDATION OF AWARDS:** Due to high administrative costs associated with processing of purchase orders, a single low bid of \$50 or less may, at the discretion of the state, be awarded to the next low bidder receiving other awards for consolidation purposes. This paragraph is not subject to the protest terms enumerated in "INSTRUCTION" above.
9. **CONTRACT FUNDING:** Bidders are advised that funds are available for the initial purchase and/or the first term of the contract. Payment and performance obligations for succeeding purchases and/or additional terms of the contract are subject to the availability and appropriation of funds.
10. **CONFLICT OF INTEREST:** An officer or employee of the State of Alaska may not seek to acquire, be a party to, or possess a financial interest in, this contract if (1) the officer or employee is an employee of the administrative unit that supervises the award of this contract; or (2) the officer or employee has the power to take or withhold official action so as to affect the award or execution of the contract.
11. **ASSIGNMENT(S):** Assignment of rights and duties under a contract resulting from this ITB is not permitted unless authorized in writing by the State of Alaska, Department of Administration, Division of General Services.
12. **SUBCONTRACTOR(S):** Within five (5) working days of notice, the apparent low bidder must submit a list of the subcontractors that will be used in the performance of the contract. The list must include the name of each subcontractor and the location of the place of business for each subcontractor and evidence of each subcontractor's valid Alaska business license. Subcontractors can only be changed per AS 36.20.115 (b).
13. **FORCE MAJEURE:** (Impossibility to perform) The contractor is not liable for the consequences of any failure to perform, or default in performing, any of its obligations under this Agreement, if that failure or default is caused by any unforeseeable Force Majeure, beyond the control of and without the fault or negligence of the contractor. For the purposes of this Agreement, Force Majeure will mean war (whether declared or not); revolution; invasion; insurrection; riot; civil commotion; sabotage; military or usurped power; lightning; explosion; fire; storm; drought; flood; earthquakes; epidemic; quarantine; strikes; acts or restraints of governmental authorities affecting the project or directly or indirectly prohibiting or restricting the furnishing or use of materials or labor required; inability to secure materials, machinery, equipment or labor because of priority, allocation or other regulations of any governmental authorities.
14. **LATE BIDS:** Late bids are bids received after the time and date set for receipt of the bids. Late bids will not be accepted.
15. **CONTRACT EXTENSION:** Unless otherwise provided in the ITB, the state and the successful bidder/contractor agree: (1) that any holding over of the contract excluding any exercised renewal options, will be considered as a month-to-month extension, and all other terms and conditions shall remain in full force and effect and (2) to provide written notice to the other party of the intent to cancel such month-to-month extension at least thirty (30) days before the desired date of cancellation.
16. **DEFAULT:** In case of default by the contractor, for any reason whatsoever, the State of Alaska may procure the goods or services from another source and hold the contractor responsible for any resulting excess cost and may seek other remedies under law or equity.
17. **DISPUTES:** Any dispute arising out of this agreement shall be resolved under the laws of Alaska. Any appeal of an administrative order or any original action to enforce any provision of this agreement or to obtain any relief from or remedy in connection with this agreement may be brought only in the superior court for the First Judicial District of Alaska.
18. **CONSUMER ELECTRICAL PRODUCT:** AS 45.45.910 requires that "a person may not sell, offer to sell, or otherwise transfer in the course of the person's business a consumer electrical product that is manufactured after August 14, 1990, unless the product is clearly marked as being listed by an approved third party certification program." Electrical consumer products manufactured before August 14, 1990 must either be clearly marked as being third party certified or be marked with a warning label that complies with AS 45.45.910(e). Even exempted electrical products must be marked with the warning label. By signature on this bid the bidder certifies that the product offered is in compliance with the law. A list of approved third party certifiers, warning labels and additional information is available from: Department of Labor, Labor Standards & Safety Division, Mechanical Inspection Section, P.O. Box 107020, Anchorage, Alaska 99510-7020, (907)264-2447

SPECIAL CONDITIONS:

1. **ORDER DOCUMENTS:** Except as specifically allowed under this ITB, an ordering agency will not sign any vendor contract. The state is not bound by a vendor contract signed by a person who is not specifically authorized to sign for the state under this ITB. The State of Alaska Purchase Order,

MAY-28-1993 16:28 FROM CASCADE BOAT CO.

TO

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STANDARD TERMS AND CONDITIONS

Contract Award and Delivery Order are the only order documents that may be used to place orders against the contract(s) resulting from this ITB.

2. **BILLING INSTRUCTIONS:** Invoices must be billed to the ordering agency's address shown on the individual Purchase Order, Contract Award or Delivery Order, not to the Division of General Services. The ordering agency will make payment after it receives the merchandise or service and an invoice. Questions concerning payment must be addressed to the ordering agency.

3. **CONTINUING OBLIGATION OF CONTRACTOR:** Notwithstanding the expiration date of a contract resulting from this ITB, the contractor is obligated to fulfill its responsibilities until warranty, guarantee, maintenance and parts availability requirements have completely expired.

PREFERENCES:

1. **ALASKAN BIDDER'S PREFERENCE:** Award will be made to the lowest responsive and responsible bidder after an Alaskan bidder's preference of five percent (5%) has been applied. The preference will be given to a person who: (1) holds a current Alaska business license; (2) submits a bid for goods or services under the name on the Alaska business license; (3) has maintained a place of business within the state staffed by the bidder, or an employee of the bidder, for a period of six months immediately preceding the date of the bid; (4) is incorporated or qualified to do business under the laws of the state, is a sole proprietorship, and the proprietor is a resident of the state or is a partnership, and all partners are residents of the state; (5) if a joint venture, is composed entirely of venturers that qualify under (1) - (4) of this subsection.
 2. **USE OF LOCAL FOREST PRODUCTS:** In a project financed by state money in which the use of timber, lumber and manufactured lumber is required, only timber, lumber and manufactured lumber products originating in this state shall be used unless the use of these products has been determined to be impractical, in accordance with AS 38.15.010.
 3. **LOCAL AGRICULTURAL AND FISHERIES PRODUCTS PREFERENCE:** When agricultural, dairy, timber, lumber, or fisheries products are purchased using state money, only those products harvested in Alaska, or in the case of fisheries products harvested or processed within the jurisdiction of Alaska, will be purchased, provided they are available, of comparable quality, and priced no more than 7% higher than products harvested outside the state, or in the case of fisheries products harvested or processed outside the jurisdiction of the state, in accordance with AS 38.15.050.
 4. **ALASKA PRODUCT PREFERENCE:** A bidder that designates the use of an Alaska Product which meets the requirements of the ITB specification and is designated as a Class I, Class II or Class III Alaska Product by the Department of Commerce & Economic Development shall receive a preference in the bid evaluation in accordance with AS 38.30.332 and 3 AAC 52.010.
 5. **EMPLOYMENT PROGRAM PREFERENCE:** If a bidder qualifies for the Alaskan bidder's preference, under AS 38.30.170(b), and is offering goods or services through an employment program, as defined under 38.30.990(10), and is the lowest responsive and responsible bidder with a bid that is no more than 15 percent higher than the lowest bid, the procurement officer will make the award to that bidder, in accordance with AS 38.30.170(c) and 2 AAC 12.050.
 6. **ALASKANS WITH DISABILITIES PREFERENCE:** If a bidder qualifies for the Alaskan bidder's preference, under AS 38.30.170(b), and is a sole proprietorship owned by a person with a disability, as defined in AS 38.30.170(j), and is the lowest responsive and responsible bidder with a bid that is no more than 10 percent higher than the lowest bid, the procurement officer will make the award to that bidder, in accordance with AS 38.30.170(e).
 7. **EMPLOYERS OF PEOPLE WITH DISABILITIES PREFERENCE:** If a bidder qualifies for the Alaskan bidder's preference, under AS 38.30.170(b), and, at the time the bid is submitted, employs a staff that is made up of 50 percent or more people with disabilities, as defined in AS 38.30.170(j), and submits a responsive and responsible bid that is no more than 10 percent higher than the lowest responsive and responsible bid, the procurement officer will make the award to that bidder, in accordance with AS 38.30.170(i).
 8. **PREFERENCE QUALIFICATION LETTER:** Regarding preferences 5, 6, and 7, above, the Division of Vocational Rehabilitation in the Department of Education maintains lists of Alaskan: (1) employment programs that qualify for preference, (2) individuals who qualify for preference as Alaskans with disabilities, and, (3) employers who qualify for preference as employers of people with disabilities.
- As evidence of an individual's or a business' right to a certain preference, the Division of Vocational Rehabilitation will issue a certification letter. To take advantage of the preferences 5, 6, or 7, above, an individual or business must be on the appropriate Division of Vocational Rehabilitation list, at the time the bid is opened, and must provide the procurement officer a copy of their certification letter. Bidder's must attach a copy of their certification letter to their bid. The bidder's failure to provide the certification letter mentioned above, with their bid, will cause the state to disallow the preference.

MAY-26-1993 16:25 FROM CASCADE BOAT CO.

TO

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**STATE OF ALASKA
INVITATION TO BID NO. 13633**

DELAYS OR INTERRUPTIONS OF OPERATIONS: For each hour of contract time lost, for any reason other than weather or an act directly attributable to state personnel aboard the vessel, the state will, on each occasion, be entitled to deduct from the total contract payment, an amount equal to the hourly contract rate for each of the hours the vessel or essential equipment on the vessel is out of service.

TERMINATION OF THE CONTRACT: The state may, without fault or liability, terminate the contract for any of the following reasons:

- 1) The condition of the vessel or essential equipment on the vessel remains such that it cannot be used for work by biological crew for a period of more than seventy-two (72) hours.
- 2) Lack of funds for the contract project.
- 3) Insubordination and/or lack of cooperation by the captain or vessel crew.
- 4) Failure of the captain, vessel, or vessel crew to report at the time and location specified in this ITB to begin the contract.

In the event of early termination of the contract state-owned gear may be placed in storage or returned to a location that is mutually agreed upon by the state and the vessel owner. Charges for gear storage will be paid by the state. The state will not assume any liability for transporting the captain and vessel crew to their home port. Contract payments will cease on the hour and date the vessel is unable to continue normal operations.

COMMAND OF THE VESSEL: The captain's orders will be final in matters regarding the general operation of the vessel, the operation of the vessel's equipment and fishing gear, the general activities and safety of the vessel crew and the biological crew and the navigation of the vessel.

The captain will obey all orders given by the biological crew leader regarding the state's research activities, provided that those orders do not endanger the vessel or the people aboard the vessel.

The captain will obey all USCG, state and other applicable regulations, rules, and statutes pertaining to the safe and legal operation of the vessel.

CONSUMABLES TO BE PROVIDED BY THE CONTRACTOR AND INCLUDED IN THE PER DAY CONTRACT PRICE: The contractor will provide all fuel, lubricants, oils, greases and filters required during the contract. At the beginning of the contract all fuel and lubricant tanks must be full and all filters must be fresh. In addition, the vessel must have aboard extra lubricants, oils, greases and filters in amounts sufficient for the entire contract period.

The contractor will provide all bait for the entire charter period.

The contractor will provide three ample, balanced, and nutritious meals each day for all biological crew, the vessel captain and the vessel crew.

MISCELLANEOUS PROVISIONS: The state may, at it's own expense and only for the term of the contract, install and retain in the vessel equipment necessary to accomplish their work. The state will remove this equipment at the termination of the contract period without damage to the vessel.

PAGE 11 OF 14 PAGES

STATE OF ALASKA
INVITATION TO BID NO. 13633

- P. Survival suits are required for all of the people aboard the vessel. This includes the captain, the vessel crew, and all of the biological crew. Sizes large and extra-large.
- Q. The vessel's main engine(s) must be diesel powered. Bids offering gasoline powered vessels will be rejected as nonresponsive.
- R. Power block to pull crab gear, minimum capacity 650 pounds.
- S. Bait chopper and sampling table (minimum 4 feet by 8 feet) for biologists.
- T. Skiff and outboard engine, minimum length of 10 feet and minimum 10 horsepower.
- U. Survival gear per Alaska Statute 20.35.110.

VESSEL CREW REQUIREMENTS:

- (a) Crew to consist of a captain with at least five (5) years of crab pot fishing experience in the Bering Sea and three (3) experienced fishermen. One of the fishermen must be an engineer with five (5) years experience aboard fishing vessels and fully knowledgeable of the vessel and equipment. Vessel crew will be expected to perform cooking and cleaning duties in addition to operating the vessel and assisting biologists by handling catches as prescribed by the biological crew leader.
- (b) The vessel crew will be expected to fish the gear. The biological crew will handle sampling of catches once they are aboard the vessel.
- (c) The state will have the right to require replacement of any vessel crew member. If the vessel operates shorthanded due to replacement or illness of a vessel crew member for a period in excess of twenty-four (24) hours, the state will deduct from the charter rate for that period of time an amount equal to the missing crewman's wages and related direct cost of employment (i.e., social security tax, unemployment insurance, etc.). The total cost of replacing a vessel crew member aboard the vessel will be at the owner's expense. The owner will be responsible for payment of wages, direct cost of employment and responsible for all crewmembers. The state will be responsible for payments of daily charter rates only, and will not reimburse the owner for vessel crew wages in addition to charter rates.
- (d) Captain will be required to complete proper fishing forms for each day of fishing, including recording weather conditions and location data. Captain and vessel crew will be required to locate scheduled fishing areas.
- (e) There shall be no abuse of alcohol aboard the charter vessel during the charter. Excessive consumption of alcohol will be determined by the biological crew leader and/or the captain and may be cause for immediate (in some cases temporary) termination of the contract.

UNUSUAL HOURS: It may be necessary to run the vessel 24 hours continuously to travel from one location to another. Further, it may be necessary to set or lift gear at night (midnight) or early in the morning (midnight to 6 a.m.).

MAY-28-1993 16:24 FROM CASCADE BOAT CO.

TO

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STATE OF ALASKA
INVITATION TO BID NO. 13633

captain and vessel crew. Each sleeping space used by the biological crew must be at least 26 inches in width at the shoulders and 77 inches long.

- C. Minimum nine cubic feet of dry storage drawer space for state equipment.
- D. Minimum six square feet of flat, clear, interior work space for daily data entry work by state biological crew. Galley table is acceptable. One 110 volt AC outlet must be available near this area.

Minimum four square feet of flat, clear, interior work space, either shelf or table, in a relatively undisturbed location, for semi-permanent installation of an electronic data entry device during the charter period. One 110 volt AC outlet must be available near this area.
- E. Minimum 500 square feet of flat, clear, exterior deck work space for state biological crew.
- F. Stove, oven, sink, galley table, and all materials and equipment necessary for daily meal preparation, cooking, and clean-up.
- G. Refrigerated storage space sufficient to maintain fresh food for all personnel for the duration of longest continuous period of operation.
- H. Freezer storage space sufficient to maintain frozen food for all personnel for the duration of longest continuous period of operation and sufficient to maintain frozen bait herring for the duration of longest continuous period of operation.
- I. Water storage or seawater conversion capable of providing sufficient fresh water to permit 25 continuous days of operation. Water supply must be sufficient to permit daily washing of dishes, clothing, and showers for all personnel.
- J. Radar, with a minimum range of 40 miles, in good operating condition.
- K. Automatic pilot in good operating condition. Automatic readout Loran C. Back-up system is desirable. Fathometer with 150 fathom range. Back-up system is desirable. Minimum of two anchors with ground tackle; all of the size and type required for the size and type of vessel chartered.
- L. Radio transmitter and receiver equipped with standard marine frequencies for the area in which operations will be conducted including VHF channels 7 and 16 and in good operating condition. Radio-transceiver with at least 25 watt output capable of operating on standard marine frequencies. Radio-transceiver: Single side-band frequencies 2309 (for receiving) and 2131 (for transmitting) to allow direct communication with RCA Alaska Communications, Inc. Back-up system is desirable.
- M. USCG approved first-aid kit.
- N. USCG approved fire-fighting equipment of the size and type required for the size and type vessel chartered.
- O. USCG approved inflatable life rafts. The rated capacity of the rafts must be adequate to accommodate all of the people aboard the vessel, this includes the captain, the vessel crew and all of the biological crew. Life raft installations must be approved by the USCG.

STATE OF ALASKA
INVITATION TO BID NO. 13633

biological crew will handle sampling of catches once they are aboard the vessel.

- H. Provide 150 pots, with lines, buoys, and bait jars. All pots must be identical in size and dimension, including mesh sizes on all panels.
- I. The Captain must provide a safety orientation briefing to all vessel and biological crew members prior to embarkation from Dutch Harbor. Both crews must have general instructions on the following:
1. The location and operation of lifesaving and emergency equipment (life rings, life rafts, immersion/survival suits, activating general alarm).
 2. Operation of assigned equipment.
 3. How to make a distress call.
 4. What to do in the event of a person overboard.
 5. What to do in the event of a fire.
 6. What to do in the event of flooding.
 7. What to do in the event of abandon ship order.

VESSEL INSPECTION: The vessel will be subject to inspection by the Department of Fish and Game. The bidder(s) must, upon 10 days notice, make the vessel available for inspection at Dutch Harbor, Alaska.

By the date set for the vessel inspection, all of the equipment called for in this ITB must be installed and functional. The successful bidder must pay the cost of all the equipment and of any vessel alterations needed to meet the requirements of this ITB.

If, at the time of inspection, a vessel fails to meet the ITB requirements, the state may consider the offer non-responsive and reject the bid or terminate the contract.

CERTIFICATE OF INSPECTION: The responsive bidder must submit a copy of its USCG "Certificate of Inspection". The bidder's failure to supply this document, within the time required, will cause the state to declare the bidder nonresponsive and to reject the bid.

SEAWORTHINESS: Inspection of the vessel is not intended to convey acceptance by the state nor should it be considered conclusive evidence that the state believes the vessel is seaworthy. If during the department's inspection or at any time during the subsequent term of the contract, conditions are noted that might affect the safety or seaworthiness of the vessel, the state will arrange for further inspection by a person with the appropriate credentials to determine if the condition of the vessel is acceptable.

VESSEL REQUIREMENTS:

- A. Length of not less than ninety feet. Length will be determined by measuring the centerline.
- B. Sleeping space for 2 or 3 the biological crew, in addition to the

**STATE OF ALASKA
INVITATION TO BID NO. 13633**

DAY 20 TO DAY 21: Delivery of cost recovery crab and onboard observer training. The vessel will serve as a platform for the state's mandatory observer program at the delivery site in Dutch Harbor, AK. The captain and appropriate vessel crew must be onboard for this purpose.

RISK TO VESSEL OWNER: Because the funding for this charter is totally dependant on the crab catch, the charter involves a monetary risk. You may receive less than the amount you bid and there is also a risk of not receiving anything. When you sign your name to this ITB, you are agreeing to take that risk.

PAYMENT FOR THE CHARTER: The vessel owner/captain will be paid the amount bid for the full twenty-one (21) days, or the amount of crab sales revenue generated in excess of the \$267,000 (Department of Fish and Game's fixed expenses), whichever is the least.

- (1) If attained, the State will retain the first \$167,000 from the receipts of harvested crabs, which will be sold under the Department of Fish and Game's Test Fish Program.
- (2) If attained, the vessel owner will receive up to \$50,000 in the form of a check from the state from the next \$50,000 in receipts of harvested crabs.
- (3) If attained, the state will receive the next \$100,000 in receipts of harvested crabs.
- (4) If attained, the vessel owner will receive either the remaining amount of receipts from the crab harvest up to the bid price of the charter or the balance of the crab harvest, whichever is the least.

The vessel will fish in the manner directed by the state officials until sufficient crabs are obtained to cover costs to the State of Alaska (\$267,000) plus the cost of the vessel charter, or until twenty-one (21) days have elapsed.

DUTIES OF CONTRACT: In the role of operations base and living quarters for the biological crew, the vessel, its captain and crew will be required to provide these services and accommodations:

- A. General navigation and operation of the vessel either underway or at anchor.
- B. Space for compiling and analyzing the data collected.
- C. Communications base for dispersing information.
- D. Basic living accommodations for 2 or 3 state biologists and technicians.
- E. Meal preparation, cooking and clean-up.
- F. General cleaning of the interior and exterior of the vessel.
- G. General assistance to the biological crew in the performance of their work. Vessel crew will be expected to handle catches as prescribed by the biological crew leader and will be expected to fish the gear. The

MAY-28-1993 16:21 FROM CASCADE BOAT CO.

TO

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STATE OF ALASKA
INVITATION TO BID NO. 13633

Insurance will be furnished to the Contracting Officer which will provide for a 30 day prior notice of cancellation, nonrenewal or material change in such insurance.

Proof of insurance is required for the following:

A. Protection and Indemnity, including vessel crew exposure, in the amount of \$300,000.

Failure to supply satisfactory proof of insurance within the time required will cause the state to declare the bidder nonresponsive and to reject the bid.

FEDERAL EXCISE TAX: Federal Excise Tax should not be included in the bid price. The State of Alaska is exempt from the Federal Excise Tax.

METHOD OF AWARD: Award will be made to the lowest responsive and responsible bidder.

PURPOSE: Contract of a vessel, with captain and three vessel crew, for the use of Department of Fish and game (DF&G) as living quarters and an operations base for monitoring and research activities relating to king crab research studies within the Bristol Bay Registration Area of the Bering Sea. DF&G will place 2 or 3 of their personnel (biological crew) aboard the vessel. Biological crew will study the crabs which are captured and monitor all catches. A total of twenty-one (21) days of charter time will be devoted to cost recovery fishing (harvesting commercial crab concentrations) and support activities for the training of shellfish observers.

LENGTH OF CONTRACT: Approximately twenty-one (21) continuous days, as biological and weather conditions permit, between approximately September 29, 1993 and October 21, 1993. The length of the charter and starting date may vary by mutual agreement between the vessel owner and the State of Alaska but payment will not exceed the twenty-one (21) day period.

CANCELLATION: This contract could be cancelled as a result of the National Marine Fisheries Service 1993 trawl survey. The state reserves the right to cancel the contract at the state's sole discretion.

Secondly, the state will have the sole discretion to cancel any contract that results from this ITB after the charter has commenced, if it is determined by the state that there is an insufficient quantity of crabs to cover the state's expense and the cost of the charter.

ESTIMATED USE: The charter dates and length of charters referenced in this ITB are the state's estimated requirements. The state does not guarantee a minimum or maximum number of charter days.

TEST FISH PROGRAM: The Test Fish Program was established by the legislature [AS 16.05.050 (15)] to allow the Department of Fish and Game to conduct research programs funded by the sale of fish caught during research. The Department of Fish and Game's expense for this research is \$267,000. The charter will be financed as follows:

DAY 1 TO DAY 19: Cost recovery fishing. Efforts will be totally directed at commercial fishing for crab to sell. Revenues for the project will be generated by retaining 100% of the male red king crab greater than six inches in carapace width.

PAGE 6 OF 14 PAGES

MAY-26-1993 16:21 FROM CASCADE BOAT CO.

TO

19874652189 P.06

**STATE OF ALASKA
INVITATION TO BID NO. 13633**

BIDDER'S NOTE: This contract involves financial risks. Please read this ITB very carefully and make certain you understand the risks and responsibilities. If you have any questions, contact the contracting officer at (907)465-4130.

PURPOSE OF CHARTER: To conduct research for king crab, Eering Sea test fishery.

LOCATION OF VESSEL OPERATIONS: Bristol Bay Registration Area T, in the Bering Sea. The charter will begin and end in Dutch Harbor, Alaska.

CHARTER PERIOD: Approximately 21 days, from September 29, 1993 to October 21, 1993, beginning and ending at Dutch Harbor, Alaska.

NOTICE OF INTENT: After the responses to this ITB have been opened and evaluated a tabulation of the bids will be prepared. This tabulation, called a Notice of Intent, serves two purposes. It lists the name of each company or person that offered a bid and the price they bid. It also serves as notice of the state's intent to award a contract(s) to the bidder(s) indicated. A copy of the Notice of Intent will be mailed to each company or person who responded to the ITB. Bidders, identified as the apparent low responsive bidders, are instructed not to proceed until a Purchase Order, Contract Award, Lease, or other form of notice is given by the Contracting Officer. A company or person who proceeds prior to receiving a Purchase Order, Contract Award, Lease, or other form of notice from the Contracting Officer does so without a contract and at their own risk.

WAGE PAYMENT FOR VESSEL CAPTAIN AND VESSEL CREW MEMBERS: The contractor will be responsible for all wage payments, and any other employment costs, for the vessel captain and the vessel crew members.

PAYMENT FOR STATE PURCHASES: The state will pay for the contract upon completion of the contract. Payments for agreements under \$500,000, for the undisputed purchase of goods or services provided to a state agency, will be made within 30 days of the receipt of a proper billing or the delivery of the goods or services to the location(s) specified in the agreement, whichever is later. A late payment is subject to 1.5% interest per month on the unpaid balance. Interest will not be paid if there is a dispute or if there is an agreement which establishes a lower interest rate or precludes the charging of interest.

HOLD HARMLESS: The contractor will indemnify, save harmless and defend the state, its officers, agents and employees from all liability, including costs and expenses, for all actions or claims resulting from injuries or damages sustained by any person or property arising directly or indirectly as a result of any error, omission or negligent act of the contractor, subcontractor or anyone directly or indirectly employed by them in the performance of this contract.

All actions or claims including costs and expenses resulting from injuries or damages sustained by any person or property arising directly or indirectly from the contractor's performance of this contract which are caused by the joint negligence of the state and the contractor will be apportioned on a comparative fault basis. Any such joint negligence on the part of the state must be a direct result of active involvement by the state.

INSURANCE: The contractor will maintain insurance satisfactory to the Division of Risk Management, Department of Administration. Certificates of

MAY-28-1993 16:26 FROM CASCADE BOAT CO.

TO

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STATE OF ALASKA
INVITATION TO BID NO. 13633VESSEL INFORMATION

VESSEL INFORMATION FORM: Bidders must complete the vessel information form below. A bidder's failure to complete the vessel information form may cause the state to reject the bid as nonresponsive.

OWNER'S NAME: ROBERT W. MILLER ADDRESS: CASCADE BOAT CO.
3214 W. MCGRAW ST.
PHONE: (206) 286-1810 SUITE 300
SEATTLE, WA 98199

VESSEL NAME AND NUMBER: CASCADE / 557441 VESSEL TYPE: CRABBER

CURRENT LOCATION OF VESSEL: DUTCH HARBOR, AK.

CALL NUMBERS AND FREQUENCY: WYT 9769 / VHF 145.55 YEAR BUILT: 1974 REBUILT 198

REGISTRY NUMBER: 557441 CRUISING SPEED KNOTS: 10.7 KNOTS

OVERALL LENGTH: 101'
[Straight line measurement from end to end over the deck, excluding sheer, measured parallel to the centerline.]

DIESEL POWERED MAIN ENGINE ☒ YES ☐ NO

VESSEL HAS BEEN INSPECTED BY THE USCG WITHIN LAST 12 MONTHS ☐ YES ☒ NO

SURVIVAL EQUIPMENT: The state requires that the inflatable life rafts carried aboard the vessel be USCG approved. The rated capacity of the life rafts must be adequate to accommodate all of the people aboard the vessel. In addition to the life rafts, survival suits are required for all of the people aboard the vessel.

Bidders must provide life rafts to accommodate at least seven people. Indicate the brand, capacity, and USCG approval number for the life raft you will carry aboard the vessel.

Example:	Raft Brand/Capacity	USCG Approval Number
	<u>Beaufort / 8 person</u>	<u>160.051/126/0</u>

	Raft Brand/Capacity	USCG Approval Number
a.	<u>SWITLIK / 8 MAN</u>	<u>160.051 / 54 / 0</u>
b.	<u>GIUGNS / 6 MAN</u>	<u>BACKUP</u>

Bidders must provide at least seven survival suits. Indicate the brand and model of survival suits you will carry aboard the vessel.

Survival Suit Brand/Model	
a. <u>IMPERIAL</u> <u>8 SUITS</u>	b. <u>1409</u> <u>→ 161-012-30</u>
<u>BAILEY</u> <u>4 SUITS</u>	<u>7-01-00</u> <u>ACL-28-2</u>

Failure to specify survival suits and USCG approved life rafts to accommodate at least seven people will cause the state to declare the bidder nonresponsive and to reject the bid.

MAY-28-1993 16:26 FROM CASCADE BOAT CO.

TO

19874652199 P.14

**STATE OF ALASKA
INVITATION TO BID NO. 13623**

USCG LICENSE: The vessel captain must be licensed in accordance with Title 46, Code of Federal Regulations (CFR), Subpart D "Professional Requirements for Deck Officers Licenses". This contract requires, at a minimum, the following license: Operator of Uninspected Passenger Vessel for Inland Waters, previously known as a Six Passenger License.

In the space provided, bidder's must enter the name of the person who will serve as captain of the vessel. That person must be properly licensed. A photo copy of that person's USCG license should be submitted with the bid and must be submitted within 10 days of the state's request. A bidder's failure to provide a copy of the license, as stated above, may cause the state to consider the offer nonresponsive and reject the bid.

If during the term of the contract, a different person is retained as captain, a photo copy of that person's license must be submitted to the contracting officer prior to the time the person begins working as vessel captain. The contracting officer must accept and authorize the change of captains. The contractor's failure to follow this procedure may cause the state to terminate the contract.

On the line below, print the name of the person who will serve as captain.

ROBERT W. MILLER OR BARRY JOHNSON
VESSEL CAPTAIN

Identify the rating held by the person named above.

AKO 1600 MASTER
FLY LICENSE
10 YEARS Exp.

- ☐ Operator of Uninspected Passenger Vessel/Six Passenger
☐ Inland ☐ Near Coastal
- ☐ Master, 25 Ton Vessel ☐ Master, 50 Ton Vessel
☐ Inland ☐ Near Coastal ☐ Inland ☐ Near Coastal
- ☐ Master, 100 Ton Vessel ☐ Master, 150 Ton Vessel
☐ Inland ☐ Near Coastal ☐ Inland ☐ Near Coastal
- ☐ Master, 200 Ton Vessel ☐ Master, 500 Ton Vessel
☐ Inland ☐ Near Coastal ☐ Inland ☐ Near Coastal
- ☒ Master, ²⁰⁰⁰ ~~200~~ Ton Vessel UNINSPECTED FISHING VESSEL
☐ Inland ☒ Near Coastal

CAPTAIN AND VESSEL CREW EXPERIENCE INFORMATION: Bidders must complete the captain and vessel crew information form below. Bidders failure to complete the captain and vessel crew information form may cause the state to reject the bid as nonresponsive.

CAPTAIN AND VESSEL CREW EXPERIENCE REQUIREMENTS: Captain must have a minimum of five (5) years of crab pot fishing experience operating in Alaskan waters. Captain must have a minimum of one years experience, as a captain, in the type and size vessel specified for this contract.

Captain's experience crabbing in Alaskan waters. 21 years.

Captain's experience, as a captain, in various size, type/class vessels.

Size type/class of vessel: 110' CRABBERS - 199 TON

PAGE 13 OF 14 PAGES

MAY-28-1993 15:27 FROM CASCADE BOAT CO.

TO

19874652169 P.15

STATE OF ALASKA
INVITATION TO BID NO. 13633Number of year experience in this size type/class of vessel: 20 years.Size type/class of vessel: 165' CRABBERS / PROCESSOR 500 TON.Number of year experience in this size type/class of vessel: 5 years.Size type/class of vessel: 100' SALMON TENDERS - 198 TONSNumber of year experience in this size type/class of vessel: 20 years.

One of the vessel crew must be an engineer. Engineer must have a minimum of five (5) years experience aboard the type and size vessel specified for this contract.

Engineer's experience in various size, type/class vessels. MIKE MALLAS - ENGINEERSize type/class of vessel: 110' CRABBER / TENDERSNumber of year experience in this size type/class of vessel: 15 years.Size type/class of vessel: RON BRILL - OWNER 110' MASTERNumber of year experience in this size type/class of vessel: 20 years.Size type/class of vessel: GARY ROTHMAN - COOKNumber of year experience in this size type/class of vessel: 15 years.

Size type/class of vessel: _____

Number of year experience in this size type/class of vessel: _____ years.

BID SCHEDULE

CONTRACT RATE	\$ <u>1,800.00</u>	x Twenty-one (21) DAYS	= \$ <u>37,800.00</u>
	PER DAY	(estimated)	TOTAL BID PRICE

FOR STATE USE ONLY: This Covers: PR#11-371-93

Appendix B.7. Sampling Instructions for Genetic Stock
Identification (S. Merkouris)

1993 Bristol Bay Red King Crab Collection Statewide Genetic Stock Identification Project

I. Introduction

Samples of crab tissues for use in allozyme studies for stock identification have been collected from 1986 to date from four major geographic regions of Alaska including Southeast, Central, Arctic-Yukon-Kuskokwim, and Westward. Laboratory analysis of 38 collections made during 1986-1992 (N=2,550) have been completed; samples collected to date in 1993 (N=150) have not been analyzed.

Preliminary data analysis of replicate samplings of the Bristol Bay red king crab stocks made by the NMFS during the annual trawl surveys (1991, 1992) indicate fluctuating allele frequencies between years at one of the informative polymorphic loci (ALP). The laboratory data have been re-examined and verified. A possible explanation for these differences may relate to the large difference in sample location between years. Attempts to re-visit this question and subsequent re-sampling of red king crab stocks for GSI in Bristol Bay were largely unsuccessful during the 1993 NMFS trawl survey due primarily to the lower priority assigned to other agency collections; a total of 24 crab were sampled of the desired N=100. Systematic sampling of this fishery for GSI has not been possible due to the lack of State funded stock assessment projects in the Bering Sea.

A sampling opportunity now exists under the auspices of the State of Alaska Revenue Fishery in Bristol Bay. The project leader and crewleader of this test fishery have agreed to collect live crab representative of both sex and size categories during the upcoming October 1993 test fishery.

II. Methods

A minimum of 100 live crab will be collected during the test fishery to meet the sampling objective of 100 crab. Crab will be kept separate from all other crab in the hold by placement within "onion bags", with latitude and longitude information of crab kept by tag placement and log data forms. Ideally, a total of 50 female and 50 male representative of all size categories and shell conditions from one (but not more than two) statistical areas will be collected. It is recommended that the crab selected for this project are taken from an area of crab concentration, and from a minimum of 20 pots (5 crab per pot) to achieve "random" selection of crab. Crab will be transported live to Dutch Harbor where the dissections and tissue collections will be made by the Shellfish Project Geneticist (Sue Merkouris); assistance will be provided by test fishery biologist staff (Byersdorfer, Tracy). Sections of all legal male crab sampled will be returned for processing; sublegal and female crab will be disposed of in accordance with area staff specifications. Tissues will be immediately frozen in liquid nitrogen (sampling instructions attached) and transported to the Anchorage Genetics Laboratory for storage and analysis.

September 1993

Genetics Laboratory
Alaska Department of Fish and Game
Anchorage

Instructions for Collection of Crab Genetic Samples

I. General info

We use tissue samples from muscle, hepatopancreas, heart and gill from individual crab to determine the genetic characteristics and profile of a particular crab stock. The most important thing to remember in collecting samples is that tissues need to be as fresh and as cold as possible at all times.

II. Protein electrophoresis sampling

A. General set up

1. Before sampling place the pre-labeled cryovials in the rack provided. Four tubes are need for each *bairdi* or *opilio*, red king crab or blue king crab. Thus, you should have 40 tubes per rack for 10 individuals.

Each tube will bear codes as follows:

a. SPECIES CODE

Two digits: BT - *bairdi* Tanner crab
OT - *opilio* Tanner crab (snow crab)
RK - Red King crab
BK - Blue King crab
GK - Golden (or Brown) King crab

b. AREA

One or two digits: e.g. BB - Bristol Bay or M - St. Matthew island.

c. SPECIMEN NUMBER

One to three digits: 1, 2, 3,100

d. TISSUE TYPE

H - Heart
M - leg Muscle
P - hepatoPancreas
G - Gill

e. YEAR

Two digits: 93 - 1993

A copy of the Sampling Gear inventory sheet is attached. All sampling equipment and left-over supplies are to be returned to

ADF&G. Copies of data forms are also attached. Forms are on rite-n-rain paper.

B. Use of liquid nitrogen

We will be using a liquid nitrogen container to immediately freeze the tissues. Inside the liquid nitrogen container are 6 cylindrical canisters. We have shipped special test tubes called "cryovials" to place the samples in. These cryovials have plastic seals and screw on caps to withstand liquid nitrogen storage. Five or six cryovials are stored in a cane.

The working time of the liquid nitrogen container under normal conditions is 81 days (35VHC) or 50 days (18HC). To prolong the liquid nitrogen, samples can be pre-frozen and added in a group to minimize the number of times the container is opened. The liquid nitrogen level can be checked periodically with a flashlight or actually measured (2.3 liters/inch in 35VHC; 1.25 liters/inch in 18HC). We recommend keeping the vial rack on ice when sampling, and placing the tissues in canes and into liquid nitrogen at least every 10 individuals (40 tubes), depending on sampling frequency and speed. If the sampling strategy is 5 crab every pot, then load tissues and place in LN2 every 5 crab.

An 18 VHC or 35 VHC container of liquid nitrogen will be placed on each vessel so capacity and working time are not expected to be a problem. The canisters, data forms, and all left over supplies are to be off-loaded in Dutch Harbor (ADF&G).

"Large" 35 VHC container:

30 canes will fit in each of the six canisters. The total capacity is 900 cryovials (5 per cane). Six cryovials may be loaded per cane if necessary.

"Small" 18HC container:

17 canes will fit in each of the six canisters. The total capacity is 510 cryovials (5 per cane). Six cryovials may be loaded per cane if necessary.

Safety with liquid nitrogen:

1. Wear gloves when placing samples in container. Liquid nitrogen boils at -196° , and it will spit and boil when samples are added.
2. Do not tip the tank over as it does not seal.
3. Keep lid on liquid nitrogen container at all times when you are not placing samples in it.
4. Use a small cooler with ice or blue ice to hold canes until an adequate number are collected to be put in liquid nitrogen

container. Depending on the conditions and the speed of sampling, place samples in liquid nitrogen after no more than one hour of sampling.

5. Use liquid nitrogen only in well ventilated areas (usually not a problem on board ship). Avoid directly breathing the vapor. The cloudy vapor that appears when liquid nitrogen is exposed to the air is condensed moisture; not the gas itself. The issuing gas is invisible.

6. Hazardous Materials Forms need to be filled out when shipping the liquid nitrogen container back to Anchorage. These will be provided with the sampling materials.

C. Actual sampling

1. Crabs must be alive when dissected. We find it easiest to set up four canes simultaneously and organize the samples in canes by tissue. Thus, muscle tissue from crab 1-5 would all be on one cane. Please try to keep the tissues and your sampling instruments as clean as possible. It is particularly easy to contaminate other tissues with fluid from the hepatopancreas. Please fill the tubes to 3/4 full, however they will burst if overfilled. If you are having trouble fitting the tissues into the tubes, cut your tissue into smaller pieces.

2. Please record the location (latitude/longitude), sex, carapace size (biological measurement, width or length depending on species), shell age, and specimen number (see data forms attached).

IV. Shipping specimens

The specimens will be shipped back to Anchorage in the liquid nitrogen container. Please contact Donn Tracy or Mike Ward in Dutch Harbor (581-1219) to arrange canister pickup and send-out. If Donn is not available, call the bunkhouse at 581-9895 or Sue Merkouris (267-2138 in Anchorage) so we can arrange shipment.

We really appreciate your help with the sampling. If you have any questions, please give us a call.

Lisa Seeb
267-2249

Sue Merkouris
267-2138


ADFG\crabins

MEMORANDUM

STATE OF ALASKA

TO: Distribution

DATE: October 21, 1993

FROM: Leslie Watson 
Fishery Biologist

SUBJECT: 1993 Bristol Bay Red King Crab Tag Recovery Program

Your assistance in the return of tags and capture information from the upcoming Bristol Bay red king crab/*C. bairdi* Tanner crab fisheries would be greatly appreciated. This is the fourth year of our red king crab tag recovery effort. Susie Byersdorfer, Kim Phillips and Kim Rudge will be on hand in Dutch Harbor to brief you and provide forms for this effort. Please direct any questions you may have to them. All information, tags, and forms should be given to the tag sampling crew or your debriefer as soon as the information is collected. Tags and information collected after the season are to be given to Donn Tracy. Here's what needs to be done:

1. Prior to tank inspections, please pass out the attached news release to vessel captains and ask them to read it and record any recapture information on the form attached to the news release.
2. There is a letter to processing workers with a very similar looking form that should be posted in appropriate areas within the processing facilities you are sampling at. Please post the letter and form prior to delivery time.
3. When you contact the captain or any crewmember at your interview please ask them if they have tagged crab aboard and/or if they have capture information. Please record all capture information as specified on the attached tag recovery form for observers and ADF&G samplers. We are especially interested in capture date and location. Remind captains to turn in their tag recovery forms as we have received lots of information from captains in this way. The lower half of the tag form documents who gave you tags and/or tag recovery location data, the vessel name, processor name and the date you sampled the crabs or gathered information.
4. If tagged crabs are available at the time of your interview, please sample them and record all data required on the tag recovery form. For each form record your name and check observer or ADF&G box. Record the tag letter if it is on the tag (crabs tagged this year will have the letter 'A' as a prefix) and tag number. Measure the carapace length (biological measurement) and check the crab for legal size

October 21, 1993

- (6.5 inches or larger in carapace width, including the spines). Assess crabs for shell condition and note their fate. Remember, sublegal crabs cannot be processed and they should not be thrown overboard at the dock in Dutch Harbor, especially by ADF&G personnel. Instruct crew to put sublegal crabs in their dead loss piles. Return tags and forms to the tag sampling crew.
5. If tagged crabs are aboard but not available at the time of your interview, please ask the crew to set them aside during the off-load and notify the tag sampling crew as soon as possible.
 6. As frequently as possible, ask lead processing personnel if any of their crew have tags or tagged crabs. Many times it is the processing workers (especially off-loaders and butchers) who find tagged crabs. Record any data received from processing workers as outlined in (3) and (4) above.
 7. If you encounter a tagged crab with a tag number between 1 and 3,422 (no 'A' prefix), document the tagged crab as noted above and REMOVE THE TAIL SECTION. Place the tail section and the tag in a ziplock bag and return to the tag sampling crew as soon as possible. These crabs are extremely important to us as they were tagged in 1990 and probably have PIT tags (10 mm electronic tags injected into the tail section) in them.
 8. Anytime anyone brings a tag to the office or hands you a tag on the dock, please take the time to collect as much information on the tag as possible. If you are too busy to deal with the tag, ask someone else to handle it. For these types of returns, which we usually get from processing workers, the vessel and processor names and approximate retrieval date are vital.
 9. There will be a tag reward program as noted in the news release for fishermen and letter to the processors.

THANKS IN ADVANCE FOR ALL YOUR HELP

Distribution:

Rance Morrison	Skip Gish	Kathy Hobart
Marilynn Barr	Jim Cofske	Mike Holman
Mike Ward	Larry Boyle	Ben Kirkpatrick
Donn Tracy	Mary Schwenzfeier	Observers
Susie Byersdorfer	Kim Phillips	Kim Rudge

ADF&G BRISTOL BAY RED KING CRAB TAG RECOVERY FORM

SAMPLER

Observer

ADF&G

[illegible]

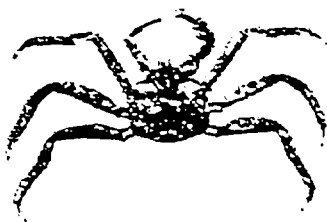
a/1 - Legal; 2 - Sublegal. b/ Shell Age: 0-Soft; 1-New; 2-Old; 3-Very Old. c/Fate: 1-Dead; 2-Rereleased

96

	Received Tag or Tagged Crab From: Name Address:	Recovery Location Data From: Name: Address:	Vessel Name	Processor Name	Sampling Date			
					M	O	D	Y R
1								
2								
3								
4								
5								

9/93

COMMERCIAL FISHERIES



NEWS RELEASE

ALASKA DEPARTMENT
OF FISH & GAME



STATE OF ALASKA
Department of Fish and Game
Carl L. Rosier, Commissioner

Westward Region
211 Mission Road
Kodiak, AK 99615

Jeffrey P. Koenings, Director
Commercial Fisheries Management
and Development Division

Contact: Leslie J. Watson
Fishery Biologist
Kodiak, Alaska

IMMEDIATE RELEASE

Date: October 19, 1993

ATTENTION ALL BRISTOL BAY RED KING CRAB FISHERMEN

The Alaska Department of Fish and Game (ADF&G) has tagged more than 15,000 legal and sublegal Bristol Bay male red king crabs during the past four years in order to gain information on population size, recruitment of sublegal crabs into the fishery, and recovery rates of newshell vs oldshell crabs. This October, a tagging study is being conducted to estimate mortality associated with the release of crabs. Highlights from these tagging studies will be available by request at the end of the year by contacting:

Leslie Watson, 211 Mission Road, Kodiak AK 99615 (907)486-1854

ADF&G is asking for your help in the recovery of tagged red king crabs during the upcoming 1993 Bristol Bay red king crab fishery. The ADF&G crab tag is yellow with an orange tab which says "LEAVE TAG ON CRAB - NOTIFY ADF&G". The Department is requesting that captains and vessel crews who catch tagged red king crab do the following:

1. Record captain's name, vessel name, target fishery, tag letter and/or tag number, fate and legal status of the crab, capture date and location on the attached form as described below.
2. For catcher processors, the observer will remove tags from legal males, record capture and reward data and return crab to the processing area. Sublegal males should also be given to the observer to record and measure; these animals will be released live, with their tags left on, as soon as possible.
3. For catcher only vessels, leave the tag on legal males, record the requested information and keep the tagged crabs separate from others in the hold, if possible. Contact the observer or

ADF&G sampler upon delivery so that the crab can be measured and the capture and reward information can be recorded. Release all sublegal males live, with their tags left on, after recording the capture data on the attached form.

4. Forward all tags and tag recovery information not collected by observers or ADF&G personnel to the Dutch Harbor or Kodiak ADF&G office. Captains will receive original tagging data for each tagged crab they document. Rewards up to \$500 per tag will be given on a lottery basis for persons who return tags with capture information from legal crabs or document returns of sublegal crabs. Please complete the tag reward information section to assure your participation in the tag reward program.

Thank you for your assistance in this program.

ADF&G WESTWARD REGION CRAB TAG RECOVERY FORM

CAPTAIN'S NAME _____ VESSEL NAME _____

SPECIES _____ SEX _____ REGISTRATION AREA _____

TARGET FISHERY _____

CAPTURE INFORMATION:

TAG LETTER	TAG NUMBER	FATE	LEGAL?	CAPTURE DATE			CAPTURE LOCATION		DEPTH (fm)	STATISTICAL AREA
				mo	day	yr	N. LATITUDE	W. LONGITUDE		
1										
2										
3										
4										
5										
6										
7										

FATE: 1=DEAD (RETAINED FOR SALE); 2=RELEASED ALIVE LEGAL? LEGAL=1; SUBLEGAL=2

TAG REWARD INFORMATION:

	NAME	ADDRESS	PHONE NUMBER
1			
2			
3			
4			
5			
6			
7			

RETURN TAGS AND
FORM TO:

LESLIE WATSON
211 MISSION ROAD
KODIAK, AK 99615
(907)486-1854

OR

DONN TRACY
BOX 308
DUTCH HARBOR, AK 99692
(907)581-1239

DEPARTMENT OF FISH AND GAME

211 MISSION ROAD
KODIAK, ALASKA 99615

October 19, 1993

To All Bristol Bay Red King Crab Processors:

The Alaska Department of Fish and Game (ADF&G) has tagged more than 15,000 legal and sublegal Bristol Bay male red king crabs during the past four years in order to gain information on population size, recruitment of sublegal crabs into the fishery, and recovery rates of newshell vs oldshell crabs. This October, a tagging study is being conducted to estimate mortality associated with the release of crabs. Highlights from these tagging studies will be available by request at the end of the year by contacting:

Leslie Watson, 211 Mission Road, Kodiak AK 99615 (907)486-1854

Please post the following notice where all processing workers are likely to read it. Processing workers are an integral part of any marine tag recovery program and vital to the tag recovery effort. Thank you for your attention to this matter.

Regards,



Leslie J. Watson
Bering Sea Shellfish Research Biologist

ATTENTION ALL BRISTOL BAY RED KING CRAB PROCESSORS

ADF&G is asking for your help in the recovery of tagged red king crabs during the upcoming 1993 Bristol Bay red king crab fishery. The ADF&G crab tag is yellow with an orange tab which says "LEAVE TAG ON CRAB - NOTIFY ADF&G". The Department is requesting that processing workers who find tagged crabs do the following:

1. If possible, notify ADF&G personnel that you have found a tagged crab so that it can be sampled prior to processing. ADF&G personnel are available in Dutch Harbor (581-1239), King Cove, St. Paul and Kodiak (486-1854; 486-1840).
2. Record the tag letter and/or number, date, time, vessel name from which the crab was delivered, and name of the processing facility you work at. For tag reward eligibility, please complete the tag reward information section on the attached form.
3. If you recover a tag but no crab, record all the requested information as in (2) above and check the box TAG ONLY.
4. Forward all tags and tag recovery information not collected by ADF&G personnel to the Dutch Harbor or Kodiak ADF&G office. Rewards up to \$500 per tag will be given on a lottery basis for persons who return tags with capture information from legal crabs. Please complete the tag reward information section to assure your participation in the tag reward program.

Thank you for your assistance in this program.

ADF&G WESTWARD REGION CRAB TAG RECOVERY FORM FOR PROCESSORS

TAGGED CRAB INFORMATION:

	Tag Letter	Tag Number	DATE TAG FOUND			VESSEL NAME	PROCESSOR NAME	Tag Only?	COMMENTS
			mo	day	yr				
1									
2									
3									
4									
5									
6									
7									

TAG REWARD INFORMATION:

	NAME	ADDRESS	PHONE NUMBER
1			
2			
3			
4			
5			
6			
7			

RETURN TAGS AND
FORM TO:

LESLIE WATSON
211 MISSION ROAD
KODIAK, AK 99615
(907)486-1854

OR

DONN TRACY
BOX 308
DUTCH HARBOR, AK 99692
(907)581-1239

Appendix D. List of reports and presentations generated from the Bristol Bay red king crab PIT tag project.

Byersdorfer, S., and L.J. Watson. 1992. A summary of biological data collected during the 1991 Bristol Bay red king crab tagging study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fishery Report 92-14, Juneau.

Byersdorfer, S., and L.J. Watson. 1993. A summary of biological data collected during the 1992 Bristol Bay red king crab test fishery charter. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 4K93-24, Kodiak.

Byersdorfer, S., L.J. Watson, and D. Tracy. 1994. A summary of biological data collected during the 1993 Bristol Bay red king crab tagging study. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 4K94-XX, Kodiak.

Donaldson, W.E., D. Schmidt, L. Watson, and D. Pengilly. 1992. Development of a technique to tag adult red king crab, *Paralithodes camtschaticus* (Tilesius, 1815), with passive integrated transponder tags. J. Shellf. Res. 11(1):91-94.

Pengilly, D., and L.J. Watson. 1992. Visible (Floy) and non-visible (PIT) tag retention experiments and automated PIT tag detection trials conducted on Bristol Bay red king crab in 1991. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K92-28, Kodiak.

Pengilly, D. and L.J. Watson. 1992. Differential harvest rates on newshell and oldshell red king crabs *Paralithodes camtschaticus* in the Bristol Bay commercial fishery: inferences from tagging studies, preseason surveys, and commercial catch sampling (abstract and presentation). Alaska Chapter of the American Fisheries Society, 19th annual meeting, Valdez, Alaska, November 16-19, 1992.

Pengilly, D., and L.J. Watson. 1993. Automated detection of PIT-tagged red king crabs in commercial deliveries to crab processing facilities. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Contribution PP-080, Juneau. (Accepted in Fisheries Research 9/93).

Pengilly, D., and L.J. Watson. 1994. Automated detection of internally injected tags in red king crabs at crab processing facilities. Fish. Res. 19(1994)293-300.

-Continued-

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- Watson, L. J., D. Pengilly, W.E. Donaldson, and D. Schmidt. 1991. A pilot mark recapture study using external tags and implantable Passive Integrated Transponder (PIT) tags on red king crab in Bristol Bay, Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K91-21, Kodiak.
- Watson, L.J. 1992. An introduction to implantable passive integrated transponder (PIT) tag technology as applied to red king crab in Bristol Bay, Alaska (summary and presentation). Pages 156 to 159 in L.E. White, editor. Proceedings of the international crab rehabilitation and enhancement symposium, Kodiak, Alaska, January 21-24, 1992.
- Watson, L.J. 1994. Bering Sea crab test fishery program: framework and Bristol Bay red king crab tagging project update (executive summary and presentation). Alaska Board of Fisheries, Anchorage, Alaska, March 15, 1994.
- Watson, L.J., and D. Pengilly. 1992. Project operational plan for the 1991 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K92-31, Kodiak.
- Watson, L.J., and D. Pengilly. 1993. Project operational plan for the 1992 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K93-5, Kodiak.
- Watson, L.J., and D. Pengilly. 1993. Project operational plan for the 1990 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K93-17, Kodiak.
- Watson, L.J., D. Pengilly, and W. Donaldson. 1993. Application of PIT tags to red king crab fishery research in Alaska (abstract and presentation). Page 31 in Pacific States Marine Fisheries Commission 1993 PIT tag workshop. Portland, Oregon, January 20-22, 1993.
- Watson, L.J., D. Pengilly, and W. Donaldson. 1993. Studies on the application of PIT tags to red king crab fishery research in Alaska (executive summary and presentation). Alaska Board of Fisheries meeting, Anchorage, Alaska, February 1-9, 1993.
-

The Alaska Department of Fish and Game administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

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